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Animal and Plant Health Inspection Service

Treatment Program for Light Brown Apple Moth in California

Environmental Assessment
February 2008

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Agency Contact:
Osama El-Lissy
Director, Emergency Management
Emergency and Domestic Programs
Animal Plant Health Inspection Service
U.S. Department of Agriculture
4700 River Rd. Unit 134
Riverdale, MD 20737

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I. Introduction

A. Biology of Light Brown Apple Moth

The light brown apple moth (LBAM) (*Epiphyas postvittana*) is native to Australia where it is an economically important pest on many fruit crops. LBAM attacks a wide variety of plants. A recently compiled LBAM host list (see appendix A) indicates there are at least 2,042 different plants that are reported to be hosts of LBAM (USDA, APHIS, 2007a). The list includes numerous native plants, forest species, and over 200 agronomically important crops, many of which are grown in California. In addition to Australia, LBAM has been found in New Zealand, New Caledonia, Hawaii, and the British Isles.

LBAM lays eggs in overlapping masses preferably on leaves but also on fruit and stems of the host plant. The larvae hatch and then pass through six stages of growth, reaching approximately 18 millimeters (mm) in length, before pupation. Young larvae are pale yellow while the mature larvae are pale green (Mo, 2006). Larvae will feed on leaves and fruit from susceptible host plants. In all stages, larvae will construct silken shelters at the feeding site which is where pupation occurs. Both female and male adults are light brown in color; however, the females are distinguished by a dark spot in the center of the front wings when folded. The number of LBAM generations produced in a growing season varies from one to over four, depending on environmental conditions (Danthanarayana, 1983; Mo et al., 2006a), although the climate in California may allow as many as five generations to occur in many areas (K. Hoffman, pers. comm.). In cases where multiple generations occur in a season, the population can build to economically important thresholds quickly.

B. History of Infestation and Treatments in California

In February 2007, LBAM was found near Berkeley in Alameda County, California. On March 16, 2007, the Agriculture Research Service Systematic Entomology Laboratory in Washington, DC, confirmed the identification of the original find as LBAM. In response, pheromone-baited traps were placed in Alameda and Contra Costa Counties to determine where LBAM populations existed in the area. On April 20, 2007, the California Department of Food and Agriculture (CDFA) issued a quarantine of at least 182-square miles in Alameda, Contra Costa, San Francisco, Marin, and Santa Clara Counties.

The United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS) issued a Federal Quarantine Order on May 2, 2007, requiring trapping, inspection, and certification of all

nursery stock and host commodities from quarantine areas. The original quarantine area consisted of eight counties. The quarantine order was revised on September 17, and again on November 20, 2007. Today the quarantine area includes the following counties: Alameda, Contra Costa, Marin, Monterey, San Francisco, San Mateo, Santa Clara, Santa Cruz, and Solano. The quarantine area will continue to expand if LBAM is identified in new counties, and will contract as LBAM is eradicated from counties.

Since March 2007, over 42,300 traps have been placed throughout California, and approximately 16,650 moths have been confirmed as LBAM (USDA, APHIS AND CDFA, 2008). Most of the captures (99 percent) are from traps located in two specific geographical areas. The first area, representing 71 percent of all LBAM captures, encompasses southern Santa Cruz and northern Monterey Counties. The second area, which represents approximately 28 percent of captures, includes contiguous portions of northwest Alameda, western Contra Costa, and northern San Francisco Counties. The remaining 1 percent of captures came primarily from single trap captures in Los Angeles, Marin, Napa, San Luis Obispo, San Mateo, Santa Clara, and Solano Counties. (USDA, APHIS and CDFA, 2008)

In May 2007, APHIS convened a group of international scientific experts (the Technical Working Group (TWG)) to provide recommendations on short- and long-term plans to contain, control, and eradicate LBAM in California. TWG toured the infested region on May 16 and concluded the tour with a 2-day meeting in San Jose, California. The distribution of LBAM was evaluated and TWG made the recommendation that CDFA and APHIS should adopt a long-term goal of eradicating LBAM from the continental United States. The short-term strategy, in pursuit of eradication, would need to include delimiting and containing LBAM populations. This strategy will require ongoing monitoring of the infestation, suppression at the edges of the populations, and population reduction in areas with a higher LBAM population density. TWG determined that the long-term strategy for eradication will require both ground and aerial application of several control techniques: mating disruption (using pheromones), insecticide treatments, sterile insects, and other techniques such as biological control (biocontrol). TWG acknowledged that some of these techniques are in the developmental stage or, at least, have not been proven operational yet. Therefore, successful eradication will rely upon refinement and adaptation of multiple control and regulatory tactics (TWG, 2007).

Based on expertise provided by TWG, CDFA and APHIS started treatment of isolated populations in June 2007. To date, isolated populations in Napa, Oakley, Danville, Dublin, Sherman Oaks, San Jose,

and Vallejo, California, have been treated with pheromone twist ties, a mating disruption technique. The areas of Napa and Oakley also were treated with three ground applications of *Bacillus thuringiensis* var. *kurstaki* (Btk), a biologically based pesticide that is effective against early larval stages of most lepidopterans (butterflies and moths). Additional isolated LBAM populations are anticipated to receive treatment in 2008.

Aerial applications of a microencapsulated form of mating disruption pheromone were made on four consecutive nights (beginning on the night of September 9 and ending in the early morning hours of September 13, 2007) to treat the Seaside, Marina, Sand City, Del Rey Oaks, Monterey, and Pacific Grove areas of Monterey County, California. The total treatment area was approximately 36,500 acres. A second treatment of the microencapsulated pheromone was applied to the same treatment site and concluded on October 27, 2007.

The northern Santa Cruz area of Santa Cruz County and the North Salinas, Boronda, Prunedale, and Royal Oaks areas of northern Monterey County also received one aerial application of the microencapsulated pheromone in November. These applications concluded on November 11, 2007. The total treatment area was approximately 52,000 acres.

Additional aerial applications of the pheromone to Santa Cruz and Monterey Counties, as well as the LBAM population center in the San Francisco-Alameda-Contra Costa County area, are anticipated to begin in June 2008. However, the pheromone formulation that may be sprayed this summer has not been determined. As a part of the selection process, the formulated material will be evaluated for potential human health and environmental effects. Once a formulation (or formulations) has (have) been selected, a more detailed discussion of its use and an analysis of its potential environmental effects will be prepared for public comment in a supplement to this EA. Spraying will not commence until after this process has been completed and any public comments received have been considered.

Fourteen public outreach meetings were held in the affected areas prior to any aerial applications to provide information to citizens regarding the eradication program. Concerns from the public were primarily directed at the use of the microencapsulated pheromone over residential areas and, to a lesser extent, concerns were expressed regarding the environment. As a means to address environmental concerns, additional aquatic toxicity studies were performed using the microencapsulated formulation with no reported effects to tested marine and freshwater organisms. Human health concerns regarding the proposed application resulted in a November 2007 joint release from California Department of Pesticide Regulation (DPR) and the California Office of Environmental Health Hazard Assessment

(OEHHA) regarding the potential human health effects of pheromone use. The report provided background on the possible effects of the pheromone and inert ingredients and discussed their effects in relation to the reports from concerned citizens. The review concluded that some of the reported symptoms could be consistent with inhalation exposure from the formulated material; however, the symptoms were consistent with exposure to other nonspecific irritants, and levels of exposure from these applications were below expected effect concentrations. The report made several recommendations that are currently being implemented in the eradication program (CDFA, 2007a; CDFA, 2007b).

Based on concerns from the public regarding outreach and as a means to facilitate better communication with stakeholders, the Secretary of CDFA established the LBAM Environmental Advisory Task Force in the fall of 2007. The task force is composed of members representing several environmental and agriculture groups with the intent to provide recommendations to CDFA regarding the minimization of environmental impacts from the LBAM eradication program, recommend research activities, provide assistance in the scoping of the environmental impact report, and provide information to member constituents regarding program activities. Task force members include representatives from the Pesticide Action Network (PAN), organic growers, Sierra Club, Save the Otters, Santa Clara University, California Polytechnic State University - San Luis Obispo, as well as others.

In December 2007, TWG met to discuss results from activities related to the program and discuss strategies for eradication in 2008. The discussions from that meeting, as well as a followup meeting in January 2008, resulted in the development of the 2008 operational plan for the LBAM eradication program. A summary of the plan was released to the public and is available at the CDFA Web site: http://www.cdfa.ca.gov/phpps/PDEP/lbam/pdfs/docs/2008_LBAM_Action_Plan_020808.pdf. During these meetings there was discussion regarding the availability of new formulations that could be used for delivery of pheromone through broadcast applications. These new formulations will be evaluated for efficacy, as well as be assessed by the OEHHA for their suitability for use over urban areas. Another outcome from these meetings was the agreement that prior to treatment with the selected formulation, OEHHA will work with local health officers to ensure that physicians and other health care providers are provided with information on the application; what, if any, symptoms are likely to be seen; reporting requirements; and direction on other concerns. In general, the physicians and health care providers will be informed of the illness reporting requirements and will receive training on pesticide poisoning recognition and management. In addition, OEHHA will team with other

public health organizations to develop and oversee a program for the reporting, tracking, and scientific evaluation of reported illness incidents.

C. Purpose and Need

APHIS is responsible for taking actions to exclude, eradicate, and/or control plant pests under the Plant Protection Act (7 United States Code (U.S.C.) 7701 et seq.). As such, it is important that APHIS take the steps necessary to eradicate LBAM from areas in California to prevent its spread to susceptible host plants throughout the United States.

Since LBAM is a new pest to the North American continent, there is little information about how the moths will respond to treatment. The lack of experience with LBAM has made it difficult to determine the best eradication approach to take in California; therefore, the recommendations of TWG, of which several members have direct experience with control of LBAM in Australia and New Zealand, have been especially welcomed. Thus far, eradication efforts have primarily relied on mating disruption with different types of pheromone treatments. Adoption of TWG's recommendations will likely result in the use of several control techniques currently available for operational use which include mating disruption using pheromones, insecticide treatments, and the release of *Trichogramma* wasps (*T. platneri* and *T. pretiosum*, two native parasitic wasps used in biocontrol projects). Other control techniques that may be useful in the future, but not currently available for operational use, include sterile insect release and other biocontrol methods. If it is decided in the future that other control techniques will be used, then APHIS will issue a detailed discussion of their use and an analysis of their potential environmental effects will be prepared for public comment in a supplement to this EA.

Four environmental assessments (EAs) have been completed as areas have been designated for treatment. These EAs include: "Eradication of Isolated Populations of Light Brown Apple Moth in California, June 2007" (USDA, APHIS, 2007b); "Eradication of Isolated Populations of Light Brown Apple Moth in California, Revised Environmental Assessment, July 2007" (USDA, APHIS, 2007c); "Treatment of Light Brown Apple Moth in the Seaside Area in California, Environmental Assessment, July 2007" (USDA, APHIS, 2007d), and "Treatment Program for Light Brown Apple Moth in Santa Cruz and Northern Monterey Counties, California, Environmental Assessment, September, 2007" (USDA, APHIS, 2007e). These EAs are incorporated into this EA by reference.

This EA will analyze the environmental impacts anticipated from the programmatic treatment of LBAM in California using mating disruption (pheromone), ground-based foliar application of insecticides, male moth

attractant treatments, and biocontrol treatments for the purpose of eradication of the pest. As the programmatic document for the LBAM eradication program, this EA incorporates all previous EAs and acts as the LBAM eradication master document for NEPA purposes.

This EA has been prepared consistent with the National Environmental Policy Act of 1969 (NEPA) and APHIS' NEPA implementing procedures (7 Code of Federal Regulations (CFR) part 372) for the purpose of evaluating how the proposed action, if implemented, may affect the quality of the human environment. APHIS is providing a 30-day public comment period for response to this EA.

D. Affected Environment

California is divided into three distinct major land resource areas (MLRA) with numerous subareas (figure 1–1, table 1–1) (USDA, NRCS, 2006).

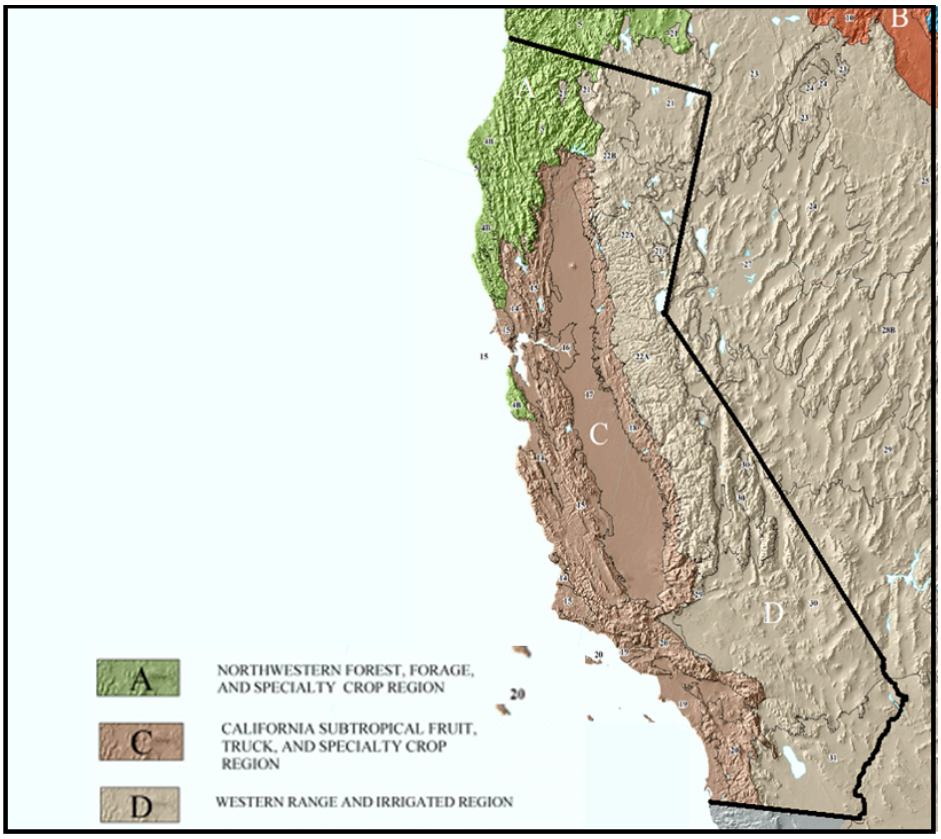

Figure 1–1. Major land resource areas within the State of California (USDA, NRCS, 2006).

Table 1–1. Major Land Resource Areas in California (USDA, NRCS, 2006).

Major Land Resource Area	Subarea
North Western Forest Forage and Specialty Range	Coastal Redwood Belt
	Siskiyou-Trinity Area
California Subtropical Fruit, Truck, and Specialty Crop Region	Central California Coastal Valleys
	Central California Coast Range
	California Delta
	Sacramento and San Joaquin Valleys
	Sierra Nevada Foothills
	Southern California Coastal Plains
	Southern California Mountains
Western Range and Irrigated Region	Klamath and Shasta Valleys and Basins
	Sierra Nevada Mountains
	Southern Cascade Mountains
	Southern Nevada Basin and Range
	Mojave Desert
	Lower Colorado Desert

Currently, LBAM has been found only on the western coast of California with high populations in the Santa Cruz, Monterey, and San Francisco areas. LBAM prefers areas that are cool (mean temp of 56 ºF) with moderate rainfall (approximately 29 inches), and moderate to high relative humidity (approximately 70 percent) and, therefore, is unlikely to thrive in the hot, dry conditions that exist in the southern parts of California (i.e., Mojave Desert and lower Colorado Desert regions), although it probably can establish itself in the irrigated areas of the region. However, it is possible that LBAM can spread throughout the other areas of California.

LBAM is less likely to establish in the colder regions of the Northwestern Forest Forage and Specialty Range with annual temperatures ranging from 40 to 59 ºF and freeze-free periods of more than 230 days. The Northwest Forest MLRA contains mostly forested areas where lumber is the major industry.

The California Subtropical Fruit, Truck, and Specialty Crop Region has annual temperatures between 51 and 69 ºF with freeze-free periods in excess of 300 days which may be ideal for LBAM survival. This area has low rainfall which occurs primarily in the winter months. This major land resource area consists of farms, ranches, and urban areas. Over the past few decades, urban development has been increasing in this ecoregion. Within this major land resource area there are three population centers of LBAM that include the San Francisco Bay area, Santa Cruz, and the Northern Monterey County area (see figure 1–2). Each is discussed in more detail below.

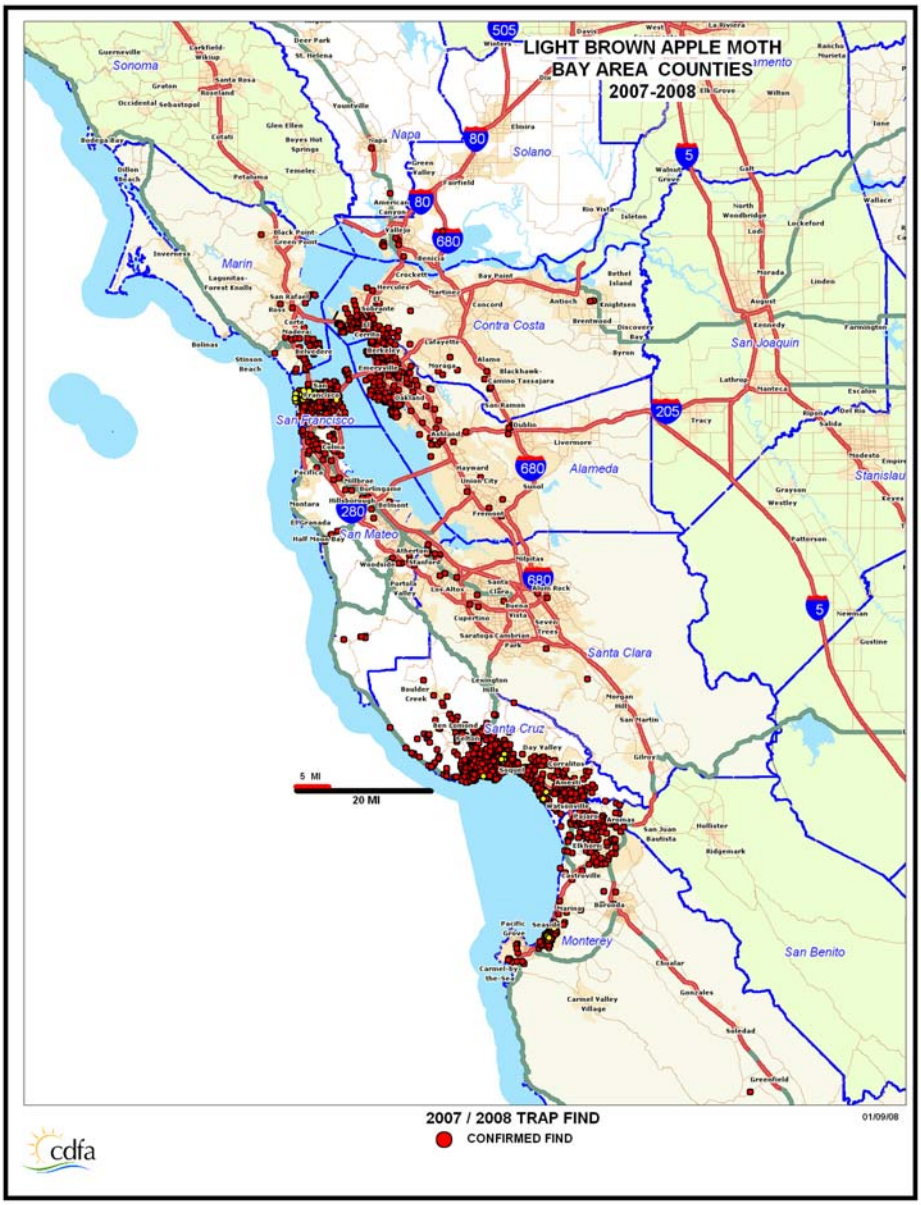

Figure 1–2. Light brown apple moth catches in 2007.

1. San Francisco Bay Area

The San Francisco Bay area is located entirely within the Central Coast Valley subland resource area. The majority of the land is used for urban development, croplands, or grasslands. The annual precipitation is between 11 and 66 inches. The rainy season is from November through January, however, may extend into February and March. The low to moderate rainfall and local stream flow is inadequate for present water needs. Water from adjoining areas is brought in for agriculture and to meet domestic and industrial requirements for the large cities, such as San Francisco.

San Francisco is laid out in a grid over some 40 hills, reaching heights of nearly 1,000 feet; this sometimes causes wide variations in weather conditions. The Pacific air keeps the temperatures generally moderate and similar to coastal areas on the Mediterranean, rarely ranging above 75 ºF or below 45 ºF.

The San Francisco Bay area is one of the most densely populated cities in the United States. There are numerous beaches, lakes, and recreational parks. San Francisco is a major tourist attraction area that includes sites such as the San Francisco Bay Bridge, Alcatraz, and the Fisherman's Wharf.

2. Santa Cruz Area

Santa Cruz and northern Monterey Counties lie within three resource subareas in California (USDA, NRCS, 2006)—the Coastal Redwood Belt, the Central Coast Valley, and the Central Coast Range. This area includes the cities of North Salinas, Boronda, Prunedale, and Royal Oaks. The extreme northwest portion of Santa Cruz County lies within the Coastal Redwood Belt major land resource area. This area has a wide elevation range, extending from sea level along the Pacific coast to approximately 3,900 feet for some coastal range peaks. The average annual rainfall ranges from 23 to 98 inches, with an average annual temperature range of 49 to 59 ºF.

Land use is dominated by forests, followed by grassland and, to a lesser extent, farming and urban development. Vegetables and fruits are grown in areas that have favorable weather and soils. Several State parks exist within this major resource land area including Henry Cowell Redwoods, Fall Creek, Natural Bridges, Twin Lakes, New Brighton, and Wilder Ranch. These parks contain a diverse population of plants, some of which are considered hosts for LBAM. For example, parks such as Henry Cowell Redwoods State Park contain Douglas fir, oak, and pine species, as well as the redwood and madrone, which are all occasional or common hosts for LBAM (appendix A). Another example, using the Wilder Ranch State Park plant inventory, contains the previously listed species, as well as other plants (such as California sagebrush, coyote brush, California bay and brome grasses) are additional plants that have known susceptibility to LBAM (Wilder State Park, 2002). These examples of host species are not inclusive and do not include all known host plants for LBAM that may occur in the park, nor does it account for those plant species that have an unknown host susceptibility to LBAM. Several LBAM-susceptible native coastal plants and other susceptible host plants also exist in State parks that occupy the coastal areas.

Within the eastern edge of the Coastal Redwood area, urban development is minor as compared to the rest of the county with major towns such as Boulder Creek, Felton, and Ben Loman. Based on the presence of LBAM

in other residential areas and the availability of hosts in the surrounding area, it is anticipated that susceptible host plants are present in these towns.

The Central Coastal Valley region comprises the second area of the affected environment in Santa Cruz and northern Monterey Counties. Within the coastal valley area, the average precipitation ranges from 11 to 66 inches, with most of the precipitation occurring as low or moderate frontal storms during winter.

Land use is divided primarily between cropland, grassland, and urban development, and, to a lesser extent, forests. Agriculture within the valley is principally truck crops, wine grapes, strawberries and other fruits, cut flowers, small grains, hay, and pasture grown under irrigation. Several crops grown in this area (e.g., strawberries and grapes) are common hosts for LBAM. Small grains are also grown under nonirrigated conditions (USDA, NRCS, 2006). Urban development within the area includes Santa Cruz, Soquel, Rio Del Mar, and Watsonville, as well as other smaller towns. The coastal valley area extends as a small strip down to and including the town of Salinas, which is part of the agriculturally important Salinas Valley.

Santa Cruz and the surrounding towns currently have LBAM infestations that are expected to expand if left untreated, based on the number of susceptible hosts in urban and open areas. This area also has several State parks and beaches such as Sunset State Beach, Manresa State Beach, and New Brighton State Beach, that occur along the coast. Several of the State beach parks have diverse plant life that includes multiple host plants for LBAM; for example, the coastal scrub and woodland habitats contain species such as coyote brush and Monterey pine, as well as other plants that are common host plants for LBAM.

The Central California Coast Range occupies the remainder of the potential treatment area within southwestern Santa Cruz and northern Monterey County. This area has an average annual precipitation of 6 to 20 inches with most of the precipitation evenly distributed between the fall, winter, and spring, with low amounts in the summer (USDA, NRCS, 2006).

Greater than half of the land use is in grassland followed by forest, cropland, and urban development. Agriculture in the area is limited to grains, with some fruit and vegetable production. Urban development consists of towns, such as Prunedale and Castroville, as well as several other smaller towns in the area. Similar to areas identified in Santa Cruz and Monterey Counties, multiple native and agricultural species are present that are considered to be common hosts for LBAM. Natural areas,

such as Royal Oaks State Park and the Salinas River National Wildlife Refuge, include plants that are known hosts for LBAM.

Monterey Bay National Marine Sanctuary (MBNMS) is a federally protected marine area offshore from California's central coast. It stretches from Marin to Cambria, and encompasses a shoreline length of 276 miles and 5,322 square miles of ocean. It supports a diverse marine ecosystem and is home to numerous mammals, seabirds, fishes, invertebrates, and plants.

3. Northern Monterey County Area

The Northern Monterey County treatment area is the coastal region that includes the cities of Seaside, Marina, Pacific Grove, Sand City, Del Ray Oaks, Pacific Grove, and Carmel by the Sea. This area contains a mix of natural coastal beach, dune, and scrub communities, as well as developed commercial and residential areas. The western portion of the area is a coastal beach area with sand dunes and native vegetation between the ocean and Route 1. To the east of Route 1 lie the developed residential and commercial properties of Seaside and Marina. The city of Monterey, California, consists of commercial and residential properties, as well as some recreational parks. Marinas are located on the coast surrounding Monterey Bay. The area has a mild Mediterranean-like climate with annual temperatures ranging from 50 to 70 ºF.

The easternmost portion of the area is within the boundary of Fort Ord, an Army training center that was closed in 1994. Fort Ord has become the first nature reserve in the United States created for the conservation of an insect, the endangered Smith's blue butterfly (*Euphilotes enoptes smithi*). With the closure of the base, portions of the land were donated to California State University - Monterey Bay, and another portion was transferred to the Bureau of Land Management (BLM) which has been designated to protect and manage 35 species of rare plants and animals and their native coastal habitats. The land also has more than 50 miles of trails for the public to explore on foot, bike, and horseback. Agricultural fields growing a variety of minor-use crops are located in the northern part of the area.

Del Monte Lake, Roberts Lake, and Laguna Del Rey Lake are in the southern end of the area just south of Seaside, California. The area also contains Monterey Peninsula Airport to the south and Fritche Federal Aviation Administration Airport to the north. A portion of the Salinas River is within the northern section of the area.

This area consists of the Central California Coastal area, as well as the Central California Coastal Valley. These two subareas of the California Subtropical Fruit, Truck, and Specialty Crop Region are discussed in detail above under the Santa Cruz Treatment Area section.

II. Alternatives

This EA will analyze the environmental impacts anticipated from the programmatic treatment of LBAM in California by incorporating TWG's recommendations into an eradication plan that will be implemented under an adaptive management approach. Two alternatives are being considered: (1) no action by APHIS to eliminate LBAM, and (2) treatment for eradication of LBAM using a plan developed from the recommendations of TWG and implemented in a framework of adaptive management.

A. No Action

The no action alternative consists of maintaining the current Federal Order without further action by APHIS. Private landowners would manage LBAM infestations on private land without State or Federal oversight.

Pursuant to the Federal Order, the following regulated articles would not be moved interstate from a quarantine area except in accordance with the Order:

- Nursery stock;
- Cut flowers, garlands, wreaths, or greenery of any plants;
- Cut trees and shrubs, including cut Christmas trees;
- Greenwaste;
- Fruits and vegetables (with certain exceptions);
- Green hay;
- Bulk herbs and spices (with certain exceptions);
- Any other products, articles, or means of conveyance of any character whatsoever, when it is determined by an inspector that they present a hazard of spread of LBAM.

B. Treatment Alternative

The treatment alternative consists of maintaining the Federal Quarantine Order to prevent the destructive spread of the LBAM infestation, as well as implementing an LBAM eradication program in California to stop the further spread of the infestation in California. The eradication program would be based upon application of recommendations made by TWG through an adaptive management approach. This means that as new information becomes available, either from TWG or results obtained from current operations, the information can be used in the decisionmaking process to modify operations to allow for the most effective program to be conducted in the most unobtrusive manner as is practicable. It is

anticipated that eradication of LBAM from California will require several years to accomplish.

1. Strategy

The primary tool to be used for eradication of LBAM will be application of pheromone to disrupt LBAM mating. Small isolated populations will be treated using twist ties impregnated with pheromone. These areas may also be treated with ground treatments of Btk or spinosad to ensure that these populations are eradicated. Aerial application of pheromone will be used as the primary tool in the large population centers. It is anticipated that aerial applications will continue in the Monterey and Santa Cruz areas as early as June, 2008, and be followed by aerial treatments in the San Francisco area. However, as previously stated, this aerial treatment will begin only after the pheromone spray formulation has been selected and its potential environmental effects have been analyzed and evaluated through a supplemental EA to this programmatic EA. After APHIS has reviewed and evaluated all public comments received on the supplemental EA regarding the use of the pheromone spray, it will publicly issue an environmental decision regarding that supplemental EA.

Male moth attractant treatments, release of native biocontrol agents, and ground-foliar sprays of pesticide are part of the eradication efforts in certain areas. The material used for male moth attraction will consist of pheromone and pesticide (permethrin) mixed into a paraffin wax material or Min-U-Gel®. When the male moth comes in contact with the treatment, it will receive a lethal dose of permethrin. In certain areas, a large number of native *Trichogramma* wasps will be released. The wasps parasitize the eggs of many species of Lepidoptera, including LBAM. In addition, ground-based foliar applications of pesticides are expected to be used in areas where larvae are present. (Each of these techniques is more fully described in the following section.) Other potential eradication and control tools (such as use of sterile insect technique (SIT) and release of other biocontrol agents) will also be considered for use as techniques are developed and refined. As these techniques are made available for use in this program, an EA analyzing any potential environmental effects resulting from those techniques will be made available to the public prior to use of these techniques.

2. Techniques To Be Used in the Eradication Program

a. Mating Disruption Using Insect Pheromones

Insect sex pheromones are compounds that are naturally produced by members of one sex for the purpose of attracting the opposite sex of the same species. Unmated female LBAM will typically release small amounts of pheromone. The male LBAM detects the pheromone and follows the pheromone trail to the female for reproductive purposes. Wide distribution of pheromone throughout an area makes it difficult for the male to locate the female, thus disrupting mating for the species. For

several lepidopteran pest species, including LBAM, the pheromone has been isolated and synthetically reproduced in order to be used to attract moths and disrupt reproduction.

There are two formulations of pheromone available to treat LBAM—a general tortricid pheromone that is attractive to species of the family Tortricidae (leafrollers), of which LBAM is a member, and an LBAM-specific pheromone. The LBAM-specific pheromone will be used when available. The LBAM-specific compound contains both the general female leafroller chemical, as well as a chemical produced solely by the female LBAM. The LBAM-specific pheromone consists of (E)-11-tetradecen-1-yl acetate and (E,E)-9,11-tetradecadien-1-yl acetate. Both compounds have been identified in extracts of female LBAM and are active as a pair when combined (Bellas et al., 1983). The pheromone can be applied in individual dispensers (twist ties) or, for larger areas, ground or aerial equipment can be used to broadcast spray the material.

(1) Aerial Application of Pheromones

Aerial application of pheromones for the management of lepidopteran pests has been used as a successful management tool in the United States. Aerial applications of pheromone to manage gypsy moth populations were used on over 200,000 acres in residential areas over the last 7 years in Illinois, Indiana, Ohio, Virginia, and Wisconsin. This acreage is a portion of more than 3 million acres that have been treated aerially with pheromone between 2000 and 2007 for mating disruption of gypsy moth. In New Zealand, pheromones have been successfully used to control LBAM. The pheromone was applied by ground to commercial crops, including citrus (Mo et al., 2006a). Since LBAM is established and widespread in New Zealand, eradication is not feasible; therefore, only commercial crops have been treated.

In California, aerial application of pheromone will be used in situations where large areas are infested with LBAM. In the fall of 2007, over 88,000 acres in northern Monterey and Santa Cruz Counties were aerially sprayed (with some areas receiving two applications) using a microencapsulated formulation of pheromone. Aerial applications involve the release of pheromone from airplanes or helicopters over the target area. With the computerized aerial navigation and delivery systems that will be used, areas can be accurately sprayed with minimal off-target deposition sites. Depending upon the length of time a formulation continues to release efficacious amounts of pheromone, the applications are expected to be repeated at 30- to 90-day intervals and will continue until two life cycles of LBAM have passed without any detections in traps. Applications may also be halted during the winter when LBAM mating is greatly reduced.

While only small amounts of pheromone are necessary in the environment to disrupt mating, the pheromone is highly volatile and degrades rapidly when exposed to the environment. Therefore, if mating disruption is to continue beyond a few days before another application of pheromone is necessary, the pheromone must be formulated in such a way as to provide for a slow release to the atmosphere. There are several formulations that will do this and allow one application of pheromone to provide sufficient levels of pheromone in the environment to disrupt mating for between 30 to 90 days. Some examples include microcapsules, biodegradable flakes, or a paraffin wax-based matrix that can provide a delayed release of pheromone. Evaluations will be made to determine whether alternative formulations have longer efficacy, which would result in fewer applications per year. As a part of this selection process, the formulated material will be evaluated for potential human health and environmental effects. Once a formulation has been selected for potential use, a more detailed discussion of its use will be published in a supplemental EA.

Initially, aerial applications are expected to begin in the southern areas of the infestation, thus treating all of the heavily infested areas in Monterey and Santa Cruz Counties. Treatments will then move north to the heavily infested areas in San Francisco (San Francisco County); Daly City and Colma (San Mateo County); Oakland, Piedmont, and Emeryville (Alameda County); El Cerrito and El Sobrante (Contra Costa County); and Tiburon and Belvedere (Marin County). If, in the course of the eradication program, other areas become heavily infested, these new areas will also be treated by aerial applications of pheromone. It is estimated that this preliminary aerial treatment will encompass between 400,000 and 500,000 acres. Treatments will cease in an area if monitoring has not detected any LBAM for a period of time equivalent to two life cycles of the moth (this time will vary depending upon temperature conditions at the location and is defined by the degree-day model used by CDFA and APHIS). As the program continues in subsequent years, aerial applications will be made in heavily infested areas, as needed. It is anticipated that aerial applications of pheromone may be needed in some areas for several years.

(2) Use of Twist Ties (Dispensers)

Twist ties utilize LBAM-specific pheromone that is contained within a sealed polyethylene tube containing 163.25 milligrams (mg) of (E)-11-tetradecen-1-yl acetate and 6.74 mg of (E,E)-9,11-tetradecadien-1-yl acetate (the two compounds that comprise the LBAM-specific pheromone). A wire is fused inside the plastic so the dispenser can be twisted around the branch of a tree or shrub. The pheromone is released into the surrounding area and disrupts the ability of male LBAM to locate females. This treatment method has been shown to be an effective means

of LBAM control in citrus, grape, apple, and apricot orchards when an adequate number of dispensers are used (Mo et al., 2006b).

The use of twist ties is very labor intensive; therefore, twist ties will be used in California primarily to treat isolated, small populations of LBAM, as described by USDA (USDA, APHIS, 2007b and 2007c). These will be applied at the rate of 250 twist ties per acre in a 200-meter radius around each LBAM find. After a period of time (equivalent to two LBAM life cycles without any detections) treatments will cease, the twist ties will be removed, and trap levels will be returned to delimitation levels for a third life cycle. In 2007, approximately 527 acres at 17 sites were treated with twist ties. Efforts at four of these sites have already met program criteria to declare eradication. At these sites, program activities were discontinued and LBAM trap levels returned to general detection levels.

b. Ground-based Foliar Application of Pesticides

Areas with high larval populations of LBAM may be subjected to ground applications of pesticides to help reduce LBAM populations. The reduction of larval populations will ultimately result in reduced recruitment into adult (mating) populations. Since mating disruption becomes more effective as adult populations become smaller, using insecticides to reduce larval populations should result in enhancement of mating disruption.

Foliar applications of insecticides would be made only with ground equipment and in limited areas. The insecticides will be applied to plants on infested properties and adjacent properties. The insecticides used for foliar applications would be either *Bacillus thuringiensis kurstaki* (Btk) or spinosad.

Btk is a naturally derived insecticide that has specific insecticidal activity against certain larval butterfly and moth species, including LBAM. Up to six applications could occur at approximately 10- to 14-day intervals using ground equipment, although in most cases only one to three applications would be made. Only formulations of Btk that are organically certified will be used in the LBAM eradication program.

Spinosad is a pesticide used on a variety of crops. It contains spinosyn A and spinosyn D which are metabolites of the fungus, *Saccharapolyspora spinosa*. These products have insecticidal activity against some butterflies and moths (Lepidoptera), thrips (Thysanoptera), flies (Diptera), termites (Isoptera), wasps, ants and bees (Hymenoptera), and some beetles (Coleoptera). No more than three applications can occur over a 30-day period with a maximum of six applications per year. Applications are limited as a means to reduce the potential for insecticide resistance in

LBAM populations. Only formulations of spinosad that are organically certified will be used in the LBAM eradication program.

In 2007, Btk was used as a foliar spray at the Napa and Oakley isolated population sites. Three applications were made at each site. These applications were made in conjunction with the placement of twist ties. No adverse environmental impacts were noted, and both sites were considered eradicated when no more LBAM were found after a period of time equivalent to two life cycles of LBAM.

c. Male Moth Attractant Treatments

Male moth attractant treatments use a combination of pheromone, to attract male LBAM, and insecticide, to kill those that have been attracted. An LBAM attracticide using both pheromone and permethrin was tested in New Zealand and found to be promising (Brockerhoff and Suckling, 1999). This method may be used in advance of aerial applications of pheromone in areas with high densities of LBAM in order to reduce populations. It may also be used in conjunction with aerial applications in buffer zones or other areas that cannot be aerially treated. In addition, it may be used in areas that are too large to allow the highly labor-intensive twist tie application to be practical, but where low levels of LBAM have been detected.

The male attraction station consists of the use of either a paraffin wax material or Min-U-Gel®, which is impregnated with a 0.5 percent concentration of LBAM pheromone and mixed with a 6 percent solution of the insecticide permethrin. Min-U-Gel® (which has been successfully used for a number of years in fruit fly eradication efforts) is a highly absorptive material that is also known as Fullers earth or Attapulgite clay. It is used in coatings, adhesives, and cosmetics, as well as over-the-counter anti-diarrhea preparations, including Pepto Bismol® (Proctor and Gamble) and Kaopectate® (Chattem, Inc.). Permethrin is a commonly used insecticide in agriculture (over 20,000 pounds of permethrin were used in Monterey County, in 2006, according to the California Department of Pesticide Regulation, Pesticide Use Database, 2006) and is used for the treatment of head lice and in pet flea and tick collars. It is also found in many common household insecticide products, including Raid® (SC Johnson Company) and Black Flag® (Reckitt & Coleman).

Each male attraction station consists of 5 to 10 milliliters of the mixture applied to utility poles and trees, on both private and public property, from ground application equipment as a very coarse squirt from a metered hand-held wand. All application sites are at least 8 feet above ground level so that it cannot be tampered with or disturbed. Applications are at the rate of 3,000 treatments per square mile (between 4 and 5 per acre).

Because of the slow release of the pheromone, male moth attractant treatments only need to be repeated at 60-day intervals.

d. Inundative Release of *Trichogramma*

Trichogramma (Hymenoptera: Trichogrammatidae) are tiny, non-stinging wasps that occur naturally in almost every terrestrial habitat. They parasitize insect eggs, especially eggs of moths and butterflies. However, in most crop systems, the number of caterpillar eggs destroyed by native populations of *Trichogramma* is not sufficient to prevent the pest from reaching damaging levels. They are the most widely used natural enemy insect in the world, and are released annually on an estimated 80 million acres of agricultural crops and forests in 30 countries (Knutson, 1998).

Since native populations of *Trichogramma* are not normally sufficient to eliminate all the eggs of a pest, the practice of inundative release is normally used. Inundative release provides enough wasps to parasitize a substantial amount of the moth eggs available. The two species of *Trichogramma* that may be used in the LBAM eradication program are *T. platneri* and *T. pretiosum.* Both are tiny (approximately 1 mm), non-stinging insects that are native to California and are sold commercially in the State. While inundative release of wasps is not expected to eradicate LBAM in an area, it is anticipated to achieve substantial reduction in LBAM population. They would normally be used in the program in heavily infested urban and residential areas where LBAM are known to be reproducing. The estimated numbers to be released would be 1 million parasitized moth (other than LBAM) eggs containing *Trichogramma* pupae per square mile.

In 2008, initial release sites would likely be in Soquel and Santa Cruz (Santa Cruz County); Carmel, Seaside, and Marina (Monterey County); and, in Golden Gate Park (San Francisco County). The purpose of their use would be to reduce the number of LBAM that are recruited into the reproducing population in advance of pheromone application, thus enhancing the impact of the mating disruption technique.

e. Other Methods

Research and development into the control and eradication of LBAM is underway and may result in new tools that can be used in the eradication efforts in California. Some new methods that are promising and may become available include sterile insect technique (SIT) and other biocontrol organisms. SIT is the release of large numbers of sterile male insects to reduce the number of fertile eggs produced by wild females. It has been successfully used in pink bollworm eradication programs and shows promise for LBAM; however, there are several factors which must

be considered before SIT can be used for LBAM, including designing, building, and operating an LBAM-rearing facility that can safely meet the production needs of an SIT program. Biocontrol efforts, beyond the inundative release of *Trichogramma,* are promising, but must be approached cautiously especially if nonnative species are considered for environmental release.

III. Environmental Impacts

A. No Action

Under the no action alternative, APHIS would not implement an integrated eradication plan. The quarantine counties would remain under the Federal Order which would limit the movement of host commodities to ensure that life stages of LBAM are not transported out of the quarantined counties. However, a quarantine zone would not stop the natural spread of LBAM, and it would continue to spread throughout the State of California and into other States of the continental United States.

The host list for LBAM is extensive and includes a wide range of crops, landscaping plants, and native plants. Cypress, redwoods, oaks, and many other varieties of trees and plants commonly found in California's urban and suburban landscaping, public parks, and the natural environment are at risk from LBAM. The list of agricultural crops includes grapes, citrus, peaches, plums, nectarines, cherries, apricots, and many others. The complete host list contains over 2,000 plant species, including more than 250 fruits and vegetables (see appendix A). In areas left untreated, LBAM crop damage levels in Australia have been estimated to be as high as 40 to 90 percent to oranges, apples, grapes, and pears (Sutherst, 2000). Based on this information, a preliminary economic analysis found that LBAM could cause an estimated $160 to $640 million annually in crop damage and control costs if it spreads to agricultural production areas in the affected counties in California (CDFA, 2007a). If LBAM were to spread throughout the entire State of California, damage and costs could reach up to $2.4 billion annually.

An economic analysis was conducted by APHIS to examine the potential risk to U.S. apple, grape, orange, and pear production from LBAM (USDA, APHIS, 2007f). The economic assessment evaluated where LBAM could be at risk for permanent establishment, based on Borchert's degree day model and LBAM's behavior in Australia (USDA, APHIS, 2007f). This analysis indicates that LBAM could become established throughout the majority of the United States with the west coast, southwestern, and southeastern States at the highest risk shown in figure 3–1 (USDA, APHIS, 2007f).

For the four crops studied, the economic assessment quantified the total annual crop loss costs if LBAM were introduced throughout the United States for oranges ($35,031,280), apples ($27,624,070), grapes ($25,624,070) and pears ($5,079,973), resulting in substantial economic losses to these four crops alone (USDA, APHIS, 2007f). However, LBAM is not just limited to the crops analyzed under the economic analysis; damage to other crops would be expected. The organic agriculture industry could be impacted more than traditional agriculture by the establishment of LBAM because it has a limited number of control options.

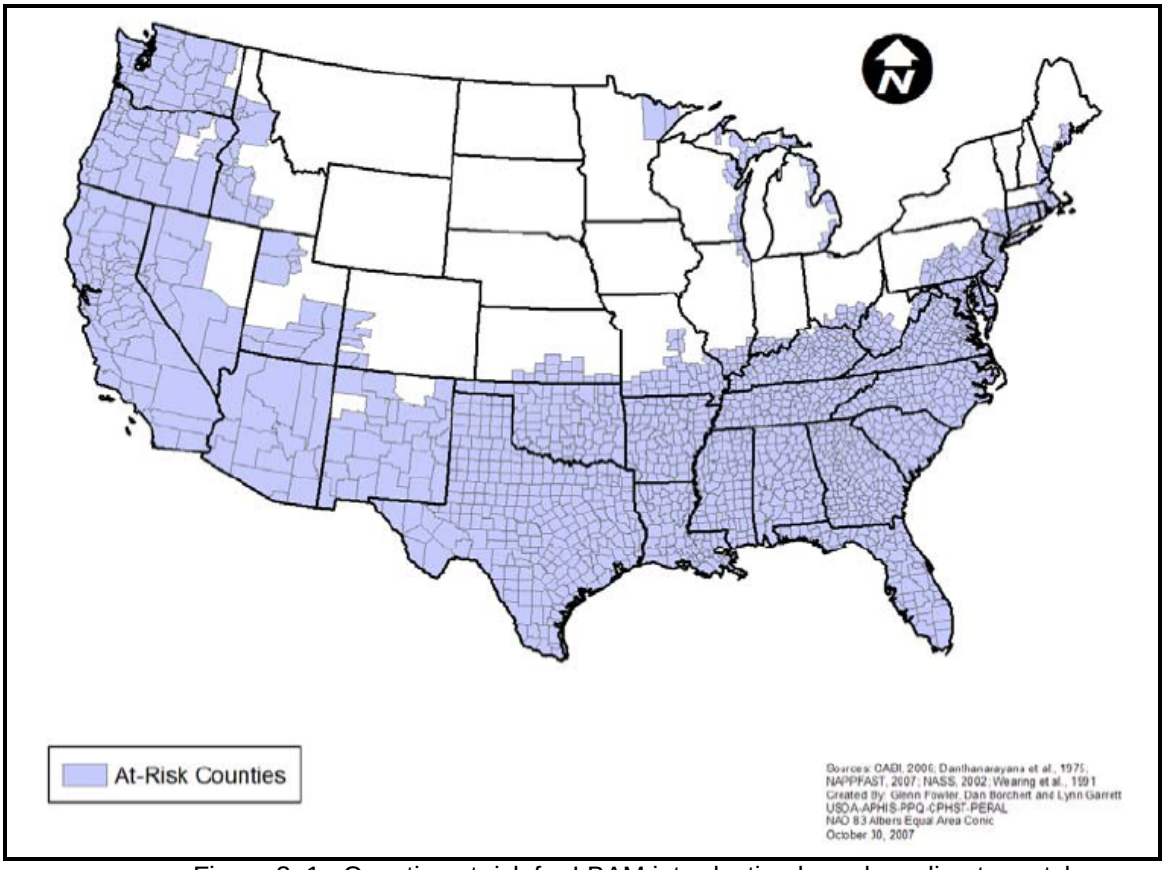

Figure 3–1. Counties at risk for LBAM introduction based on climate match (USDA, APHIS, 2007f).

In addition to crops, many varieties of nursery stock and cut flowers are also host plants for LBAM. It is speculated that the movement of nursery stock has led to the spread of LBAM throughout the counties under the quarantine. The Federal Order and the State quarantine have been implemented to prevent the further spread of LBAM outside these areas. Although the quarantines would still be in place under the no action alternative, without eradication efforts the number of LBAM would

increase as well as disperse naturally making it more likely that LBAM would expand its range in California and, perhaps, beyond California.

Furthermore, the presence of LBAM in the quarantine counties has caused restrictions on domestic and foreign trade. Both Mexico and Canada have placed limitations on agricultural exports from infested areas. Mexico has even suspended importation of LBAM-host crops (primarily fruits and nursery stock) from quarantined countries. In 2003, California shipped over $7.2 billion in food and agricultural commodities around the world (CASS, 2004). The loss of revenue due to quarantine restrictions is currently unknown; however, this loss could be significant if LBAM becomes established throughout the State of California and other parts of the United States. Updates with information on Canadian LBAM-related quarantine restrictions can be found at: http://www.inspection.gc.ca/english/plaveg/protect/dir/d-07-03e.shtml#12c.

In the absence of a coordinated eradication program, it is likely that private individuals will use pesticides to manage LBAM in an effort to prevent crop damage. Although this would limit damage from LBAM for the year the pesticide is applied, without coordinated eradication efforts the treatments likely would have to occur annually because treated fields would become reinfested from untreated LBAM sites. In addition, to be most effective, insecticides need to be used as part of an integrated approach to pest control because LBAM larvae do not feed in the open. Being leafrollers, they tend to feed from within the protective leaf rolls and, thus, are not subjected to pesticide exposure on leaf surfaces to the extent that most insects would be. As pesticide treatments would increase, there is the possibility that insecticide resistance could develop in some situations (Sutherst, 2000).

Alternative pesticides, in most cases, would have higher use rates and increased risks to human health and the environment than the treatments under the preferred alternative. Pesticides can be transported from target sites via drift and surface water runoff to off-site areas. Treatments applied year after year would increase pesticide loading, and potentially have negative environmental effects.

B. Treatment Alternative

1. Pheromone Applications

Application of pheromones as a mating disruption tool in the LBAM eradication program can occur through the use of twist ties, which are applied manually or by ground or aerially, using a variety of different formulations. In 2007, microencapsulated pheromone formulations were used in the aerial pheromone applications. These applications provided an approximate 30-day efficacy period. As a means to increase the efficacy

duration of ground and aerial broadcast applications, studies are currently in progress to determine whether alternative formulations have longer efficacy resulting in fewer applications per year. As a part of this selection process, the formulated material will be evaluated for potential human health and environmental effects. Once a formulation has been selected, a more detailed discussion of it will be prepared for public comment in a supplement to this EA. The analysis below regarding pheromone risk is specific to straight chain lepidopteran pheromones (of which the LBAM pheromone is included), and does not consider the various formulations, unless specifically stated. This information has been addressed in prior EAs that were prepared for the LBAM eradication program (USDA, APHIS, 2007b, 2007c, 2007d, 2007e) and includes updated information, where available.

a. Toxicity

Based on the available acute mammalian toxicity data for approximately 10 structurally similar lepidopteran pheromones, the median lethal oral dose ($LD_{50,}$ i.e. the dose required to kill 50 percent of a test population) for rats would be considered practically nontoxic with values ranging from greater than 5 grams per kilogram (g/kg) to greater than 34.6 g/kg (Touhey 1990; SERA, 2006). Acute dermal toxicity is also considered low with LD_{50} values ranging from greater than 2 g/kg to 20.25 g/kg based on study results from nine acetate based straight chain lepidopteran pheromones. Inhalation hazards are also low based on results compiled from three studies that show that the median lethal concentration ($LC_{50,}$ i.e. the concentration required to kill 50 percent of a population) values range from 3.3 to 33.2 milligrams per liter (mg/L) (Touhey, 1990; Inscoe and Ridgway, 1992; Weatherston and Stewart, 2002).

Chronic toxicity data is limited for straight chained lepidopteran pheromones since the U.S. Environmental Protection Agency (EPA) waives these types of studies based on their low acute toxicity and the low potential for long-term exposure. Available subchronic and developmental mammalian toxicity studies have shown no mutagenic, carcinogenic, or developmental effects for all tested pheromones (Touhey, 1990). Daughtrey et al. (1990) dosed rats daily 5 days per week for 13 weeks with tridecyl acetate at doses ranging from 0.1 to 1.0 g/kg/day. The calculated no observable effect level was found to be 0.1 g/kg/day based on a slight increase in liver weight which is consistent with long-term dosing. The pheromone is considered a slight to moderate dermal irritant when applied in a concentrated form directly to the skin (Pacific Biocontrol Corporation, 2007). This indicates that applicators should wear protective clothing when handling large quantities of pheromone.

Data for structurally similar pheromones indicate there is very low acute toxicity to birds with LD_{50} values greater than 2,000 mg/kg (Weatherston and Stewart, 2002).

Toxicity to aquatic organisms for these types of pheromones suggest that fish are less sensitive, with LC_{50} values greater than 100 parts per million (ppm), while aquatic invertebrates appear to be more sensitive with toxicity values that range in the upper parts per billion (ppb) to low ppm range (Weatherston and Stewart, 2002; PMRA, 1994; Inscoe and Ridgway, 1992). Toxicity values for aquatic invertebrates may not represent actual exposure levels in the environment due to the fate of the pheromone . Since the pheromone is hydrophobic, large amounts of pheromone must be added to the test chamber in order to obtain detectable amounts of pheromone in the water or else a solvent must be used. In the proposed applications, no solvent will be used and application rates are low at 15 to 20 grams active ingredient per acre (a.i./acre). In addition, these types of pheromones are considered insoluble, and it would not be possible for a body of water to achieve levels of dissolved pheromone that could approach toxic levels for aquatic invertebrates.

The lack of aquatic invertebrate toxicity below solubility is a characteristic of other pheromones (Touhey, 1990; SERA, 2006). To determine whether this relationship is the same for the LBAM formulation, a 7-day *Ceriodaphnia dubia* and fathead minnow study was conducted using the technical material and a microencapsulated formulation of the LBAM pheromone (Werner et al., 2007). Results from the study revealed that at a microcapsule concentration which could result from a direct application (909 microcapsules/square foot), there were no lethal or sublethal effects to *C. dubia* or the fathead minnow when dosed at 1.4 and 0.5 times the maximum distribution of microcapsules from a direct application. A similar lack of effects were noted for the marine mussel (*Mytilus galloprovincialis*) when testing the LBAM formulation at approximately 0.3 times the direct maximum application rate for terrestrial applications. The mussel test concentrations were established based on observed drift card data from the first application in Monterey which were lower than the maximum direct rate that was noted above. No effects were observed when assessing survival and development in a 48-hour exposure (Phillips et al., 2007). These results are highly conservative since direct applications to water are not permitted, and the ratio of microcapsules to water volume in the laboratory exposure is much greater than would be expected if the product was applied directly to a body of water in the environment.

In addition to testing the formulated product, the technical material was tested at concentrations that exceed the solubility of the pheromone. Solubility studies have been attempted with the LBAM pheromone; however, due to its extremely low solubility, no value could be quantified. Since the solubility cannot be quantified and toxicity effects using the technical material occur above the limit of solubility, their use in assessing the actual risk to aquatic

organisms is limited since they don't provide a realistic exposure scenario. In addition, there are no situations where technical pheromone alone would be applied since it is extremely volatile and would not be efficacious. Based on nominal technical pheromone concentrations of 12 and 24 ppb, there were no lethal or sublethal effects reported for *C. dubia* during the study.

In a previous study, 100 percent mortality was observed at test concentrations ranging from 100 to 400 ppm, which is approximately 10,000 times above what would be expected from a direct application of technical material into a shallow body of water (Werner et al., 2007). To illustrate, the observed effect concentrations could not be achieved even if the total amount of pheromone that was applied in the Santa Cruz application of 52,000 acres was directly applied into a 2-acre pond with a depth of 6 feet. In addition, as pointed out previously, the technical pheromone is not soluble in water. Technical pheromone cannot be used without being applied in some type of formulation.

A similar study using fathead minnows exposed to technical LBAM pheromone at concentrations ranging from 12 to 48 parts per million resulted in no significant adverse effects (Werner et al., 2007). The toxicity values from testing the technical pheromone are not realistic exposure concentrations that could occur in the environment. First, the technical material is insoluble and the reported concentrations could not occur in water. Second, the technical material is highly volatile and unstable and could not be applied alone since it would degrade. This is why it has to be formulated into a matrix that allows for delayed release. Finally, these studies occurred as daily renewals of the pheromone in an attempt to provide continuous exposure over a 7-day period, which could not occur in the environment due to rapid degradation. The lack of aquatic toxicity of the formulated pheromone, in this case using microcapsules, has also been observed in another pheromone delivery system which utilizes a large flake formulation to deliver gypsy moth (*Lymantria dispar*) pheromone (SERA, 2006).

b. Exposure and Risk

Lepidopteran pheromones are sensitive to ultraviolet radiation and oxidation; they breakdown rapidly in terrestrial and aquatic environments. The rapid breakdown and volatilization of lepidopteran pheromones and their mammalian toxicological profile have resulted in EPA waiving the requirement of a food tolerance when applications do not exceed 150 grams of active ingredient per acre per year (g a.i./ac/year) and not requiring a reentry interval in pheromone treated fields. In addition to rapid degradation, lepidopteran pheromones have very low solubility or are insoluble in water suggesting low aquatic residues (OECD, 2002; SERA, 2006). The LBAM-specific pheromone is reported to be insoluble in water (Pacific Biocontrol Corporation, 2007).

Exposure to humans, domestic and other nontarget animals, and the environment is expected to be minimal. In the case of the dispenser application, the pheromone is inside a plastic tube that is suspended in a tree; therefore, no human-related exposure from residues or drinking water is expected. The same would also be true for terrestrial nontarget organisms where exposure would be expected to be minimal. Exposure to aquatic organisms would not be expected when dispensers are used because dispensers are not placed in water, and labeling instructions prohibit discarding dispensers in surface water.
Pheromone that would be broadcast applied in a ground or aerial application as a formulated material in open and residential areas would pose a minimal risk to human health due to the known mammalian toxicity profile for lepidopteran pheromones and their environmental fate which results in low exposure. No dietary exposure from food is expected because of the volatility of the pheromone. Incidental exposure through drinking water sources or swimming pools is expected to be minimal because the pheromone is insoluble in water and would remain at the surface volatilizing into the atmosphere. Inhalation exposure is also expected to be low based on the fate and low application rates (15 to 20 g ai/ac). Both the low toxicity and lack of significant exposure result in minimal risk to human health from the LBAM pheromone.

Exposure to nontarget aquatic organisms from ground and aerial broadcast applications is expected to be low since direct applications to water are prohibited, and the computerized aerial navigation and delivery systems greatly reduce the likelihood of spraying over water. In addition, any incidental off-site transport would result in aquatic concentrations well below any potential effect or solubility levels. Reported effects levels with the technical material to aquatic invertebrates and fish are orders of magnitude below any residues that could possibly occur due to the volatility and lack of solubility of technical straight chain lepidopteran pheromones. The lack of toxicity of the formulated material at levels approaching a direct application suggests minimal risk to aquatic organisms.

The only nontarget species that may be impacted by the use of pheromones could be native (or exotic) leafrollers that may be present and could have their mating disrupted by the use of the general leafroller pheromone. Any impact to leafrollers would be minimal and temporary as populations would quickly recover due to immigration of leafrollers from adjacent, untreated areas. This potential impact would be further reduced by the preferred use of LBAM-specific pheromone.

c. Summary

Straight chain lepidopteran pheromones, such as LBAM, have low application rates, and break down rapidly in the environment. Ground applications using twist ties or ground and aerial broadcast applications result in similar pheromone levels. These levels are considered to be extremely low. This group of compounds has low mammalian toxicity, and when the toxicity data is compared to the potential exposure levels there is minimal risk to human health. Risk is also low for terrestrial nontarget wildlife and, in particular, nontarget aquatic organisms because toxicity has not been observed at levels below solubility for these types of pheromones, including the LBAM pheromone.

2. Ground-applied Pesticides

As part of the integrated eradication program, ground treatment with insecticides may be required in certain situations in conjunction with pheromone use to insure elimination of isolated populations. The two products considered for use in these treatments will be spinosad and Btk. The use of one product as opposed to the other will be based on the conditions at the treatment site and the life stage of the insect that requires treatment.

a. Spinosad

(1) Toxicity

Spinosad is an insecticide that contains the two active ingredients, spinosyn A and spinosyn D. Spinosyn is a metabolite of the fungus, *Saccharapolyspora spinosa*, which has been shown to demonstrate insecticidal activity (Thompson et al., 2000). Spinosad is registered as a reduced risk pesticide by EPA, Office of Pesticide Programs and is listed by the Organic Material Reviews Institute (OMRI) for use in organic production. It has insecticidal activity against some butterflies and moths (Lepidoptera), thrips (Thysanoptera), flies (Diptera), termites (Isoptera), wasps, ants and bees (Hymenoptera), and some beetles (Coleoptera) (Cleveland et al., 2001). Spinosad is used in two primary formulations, Tracer® and Entrust®, to control a wide variety of pests on multiple crops.

Spinosad has low toxicity to mammals based on acute LD_{50} values of 3,738 mg/kg and >5,000 mg/kg for male and female rats, respectively (EPA, 1997). The dermal and inhalation toxicity is also low with a dermal LD_{50} value of >2,000 mg/kg in the rat, and an inhalation acute LC_{50} value of >5.18 mg/L in the rabbit (EPA, 1997). Based on chronic exposure studies, spinosad has not been shown to be carcinogenic, mutagenic, or a reproductive toxicant in rats. Metabolism studies revealed that spinosyn A and D have similar routes of excretion and are metabolized in a similar manner with most of the material excreted within 48 hours.

Spinosad also has low toxicity to birds with acute LD_{50} and LC_{50} values for the bobwhite quail and mallard duck greater than the highest test concentration tested, 1,333 mg/kg and 5,156 mg/kg, respectively (EPA, 1997). Chronic toxicity to birds is also low with a no observable effect concentration (NOEC) of 550 ppm for the bobwhite quail and mallard duck. Toxicity tests using terrestrial plants demonstrate that spinosad is not phytotoxic. Toxicity to terrestrial invertebrates has shown a range of sensitivities based on the test species and exposure route (Holt et al., 2006; Miles and Eelen, 2006; Kim et al., 2006; Medina et al., 2003; Cisneros et al., 2002; Elzen, 2001). Spinosad has comparatively lower toxicity to predatory mites and other beneficial insects such as predatory bugs (Hemiptera), flies, beetles and spiders (Miles and Eelen, 2006). Parasitic wasps appear to be more sensitive to spinosad when compared to predatory insects (Miles and Eelen, 2006; Williams et al., 2003). Spinosad is highly toxic to honeybees and bumblebees, based on oral and contact studies (EPA, 1997; Morandin et al., 2005).

Spinosad is slightly toxic to fish, with carp (*Cyprinus carpio*) being the most sensitive of the species tested (LC_{50} = 4.99 mg/L) and the rainbow trout (*Oncorynchus mykiss*) being the least sensitive (LC_{50} = 30 mg/L). In chronic early life stage studies, the rainbow trout (*O. mykiss)* had a NOEC value of 0.498 mg/L while the sheepshead minnow's NOEC value was 1.15 mg/L. Acute aquatic invertebrate toxicity is comparable to fish, based on toxicity values for *Daphnia magna* and the mysid shrimp (*Palaemonetes pugio*; however, spinosad is considered highly toxic to the eastern oyster (*Crassostrea virginica*), with a median lethal effective concentration (EC_{50}) value of 0.295 mg/L. Chronic toxicity to aquatic invertebrates ranged from a NOEC of 0.62 mg/L for *D. magna* in a 25-day exposure study to a NOEC of 84.2 mg/L for the mysid shrimp in a 28-day exposure (Cleveland et al., 2001). Toxicity to aquatic plants varies widely with green algae (*Selenastrum capricornutum*) being the least sensitive (EC_{50} >105 mg/L), and the freshwater diatom (*Navicula pelliculosa*) being the most sensitive species with an EC_{50} and NOEC value of 0.135 and 0.049 mg/L, respectively (Cleveland et al., 2001).

(2) Exposure and Risk

Spinosyn A is considered soluble at 89.4 mg/L while spinosyn D is comparatively insoluble at 0.49 mg/L. In soil, spinosyn A has a relatively short half-life ranging from 9.4 to 17.3 days, while spinosyn D has a soil half-life of 14.5 days. Spinosyn A and D are not considered mobile based on the soil-binding affinity of spinosyn A which has reported adsorption coefficients ranging from 5.4 to 323. The soil-binding affinity for spinosyn D is unknown; however, it is assumed to be higher than spinosyn A because of its low solubility in water. In field dissipation studies, the half-lives for spinosyn A were short with a reported range of 0.3 to

0.5 days. In aquatic environments, spinosyn A and D are considered stable to hydrolysis at all relevant pH values; however, photodegradation in water results in a half-life of less than a day for spinosyn A and D. Spinosyn A has been shown to have a low potential to bioaccumulate in fish tissue.

The exposure and risk of spinosad to human health is expected to be low due to the favorable toxicity profile, low application rates, ground-only applications, and the fate of spinosad in the environment. Exposure to nontarget terrestrial mammals and birds is also expected to be low due to low toxicity and application rates and the rapid breakdown of spinosad in terrestrial environments. Compliance with the labeling instructions that states the product is toxic to bees exposed for 3 hours following treatment, and that applications should not be made to blooming, pollen-shedding, or nectar-producing parts of plants during bee foraging periods will reduce risks to honeybees (Mayes et al., 2003).

In areas of application that are in proximity to aquatic environments, there is the potential for exposure to aquatic organisms; however, for fish and aquatic invertebrates, exposure levels will be at concentrations that result in minimal risk. Compliance with precautionary labeling instructions will further reduce off-site transport of spinosad to aquatic environments.

b. *Bacillus thuringiensis kurstaki* (Btk)

Btk is a naturally derived soil bacteria that has selective insecticidal activity against certain Lepidoptera, Coleoptera, and Diptera insects; however, sensitivity within these groups can vary. Btk has previously been identified as a possible pesticide that could be used as a ground treatment for isolated populations of LBAM in conjunction with pheromone use. Below is information that was provided in an earlier EA (USDA, APHIS, 2007b, 2007c).

(1) Toxicity

Based on mammalian toxicity studies testing the technical active ingredient and the formulated product, Btk has low acute oral, dermal, and inhalation toxicity and pathogenicity (EPA, 1998; USDA, FS, 2004). These laboratory studies have also been supported by epidemiology studies that revealed no direct human health effects from Btk applications. Results from laboratory and epidemiology studies indicate that Btk is not a carcinogen, mutagen, or a reproductive toxicant (EPA, 1998; USDA, FS, 2004). Btk is not considered a strong irritant, based on the proposed use pattern for this program.

Btk is considered to have low toxicity to birds, based on acute oral and dietary toxicity values. Oral LD_{50} values were greater than 3,333 mg/kg/day and dietary LC_{50} values were greater than 1.8×10^{10} spores/kg for the bobwhite quail and mallard duck (EPA, 1998). Chronic toxicity data for birds is not available based on the low acute toxicity of Btk. The lack of acute toxicity to birds is supported by several field studies where no direct effects to birds were seen in forestry applications of Btk; however, some indirect effects were noted in studies where birds relied on caterpillar larvae as a primary food source. In some cases slight effects on reproduction, such as nestling growth rates, were noted (Norton et al., 2001); however, in other studies, no indirect effects on reproduction were noted (USDA, FS, 2004). The studies that noted indirect effects had applications over large forested areas which will not occur in the proposed treatments for LBAM. Effects to nontarget terrestrial invertebrates are highly variable and dependent on the test organism. Even within the lepidopteran group that contains butterflies and moths, sensitivities can be highly variable (Peacock et al., 1998). In general, toxicity to pollinators and beneficial insects is considered low based on laboratory and field studies testing honeybees, as well as other beneficial insects (USDA, FS, 2004).

Btk has low acute aquatic vertebrate toxicity based in laboratory studies with multiple freshwater and saltwater fish species. In all cases, the calculated LC_{50} value was above the highest test concentration used in the study (USDA, FS, 2004). Sublethal toxicity to fish is also low with a reported NOEC of 1.4 mg/L for the most sensitive fish species. Btk has low toxicity to *D. magna* in 21-day studies with EC_{50} values between 5 and 50 mg/L, while other aquatic invertebrate groups such as mayflies, stoneflies, copepods, and mysid shrimp appear to be tolerant of Btk when exposed to concentrations well above those expected in the environment (USDA, FS, 2004). Results from laboratory studies are supported by field data that suggest minimal effects to aquatic invertebrates from Btk use (Richardson and Perrin, 1994; Kreutzweiser, et al., 1992; USDA, FS, 2004).

(2) Exposure and Risk

Btk persistence in terrestrial environments is dependent upon light, moisture, and temperature. Increased exposure to light, higher temperature, and moisture decrease the viability of Btk. In a summary regarding the environmental fate of Btk, the majority of studies indicate that insecticidal activity of Btk is approximately 1 week; however, other studies have shown that while spore viability can decrease rapidly, insecticidal activity can persist up to 3 months under certain environmental conditions (USDA, APHIS, and FS, 1995). In water, Btk activity is photolytically sensitive and dependent on organic matter content and salinity (USDA, APHIS and FS, 1995). Spores have been

detected in aquatic field studies for 13 days and up to 4 weeks after spraying.

Based on the method of application and environmental fate information for Btk, nontarget exposure is expected to be low. Low toxicity and exposure will result in minimal risk to nontarget organisms. Compliance with labeling instructions prohibiting the application of Btk to surface water will further reduce the risk to nontarget aquatic organisms.

(3) Summary

Spinosad and Btk have favorable environmental profiles, as well as low use rates that result in low exposure in the environment. The generally low toxicity to mammals and other nontarget organisms, along with the low exposure, results in minimal risk to human health and the environment from ground applications of spinosad and Btk. Label requirements and other restrictions, where appropriate, will further reduce risk to sensitive organisms, such as some aquatic organisms and pollinator species.

3. Male Moth Attractant Treatments

Male moth attractant treatments will be used in certain areas where insecticides and pheromones cannot be broadcast applied. These treatments consist of the use of either Min-U-Gel® or a paraffin wax material to deliver a 0.5 percent concentration of the LBAM pheromone and a 6.0 percent concentration of permethrin. The application method consists of using ground-based equipment to apply a gel material to telephone poles and trees using a metered hand-held wand. The potential for human health and environmental exposure is extremely low since the applications cannot drift or move off-site from runoff due to the application method and the fact that the materials are considered to be rainfast.

a. Toxicity

The material that makes up the Min-U-Gel® formulation is known as Fullers earth or Attapulgite clay, which is a highly absorptive clay material used as a thickening or adsorptive agent for many different commercial applications. Min-U-Gel® is considered practically nontoxic from an oral, dermal, or inhalation route and is considered a mild irritant when applied directly to the eyes. The clay does contain respirable crystalline silica quartz at concentrations less than 1.0 percent. The silica quartz component of the clay is listed as a possible human carcinogen under California Proposition 65 for inhalation exposure; however, since the material is mixed with a liquid diluent, it will not be available for inhalation. (California Proposition 65 is the common reference for the California statute, The Safe Drinking Water and Toxic Enforcement Act of 1986, by which the State develops a list of chemicals known to the State to cause cancer or reproductive toxicity.) The other material which

could be used is a paraffin wax-based material which has been shown to be an effective means of delivering pheromone (Atterholt et al., 1998, Stelinski et al., 2007).

Permethrin, which will be mixed with the Min-U-Gel® or the paraffin material, is a pyrethroid insecticide that has a varied toxicology profile when considering toxicity to aquatic and terrestrial organisms. Acute mammalian toxicity is variable with oral LD_{50} values ranging from approximately 40 mg/kg to greater than 3,580 mg/kg. Dermal toxicity is considered low with LD_{50} values of greater than 2,000 mg/kg for the rabbit and rat (EPA, OPP, 2003). Acute inhalation is also low (LC_{50} >23.5 mg/L), as is the potential for acute eye and dermal irritation (EPA, OPP, 2003). Chronic toxicity studies of permethrin have demonstrated low toxicity in prenatal developmental and reproductive studies. Based on the review of studies submitted to EPA, OPP for reregistration of permethrin, the no observable adverse effect level (NOAEL) in these types of studies ranged from 50 mg/kg/day to 600 mg/kg/day (EPA, OPP 2003). Based on long-term toxicity studies that also assessed carcinogenicity using the dog, rat, and mouse, the NOAEL values ranged from 36.9 to 316.1 mg/kg/day, depending on species and endpoint. Permethrin has been established as a possible human carcinogen by EPA, OPP; however, the levels where those types of effects occurred were high relative to exposure levels, and the effect was only seen in mice and not the rat or dog studies. Permethrin is not listed as a California Proposition 65 chemical.

Nontarget terrestrial vertebrates, such as birds, do not appear to be sensitive to permethrin exposure based on the low LD_{50} toxicity values for several bird species that range from >2,000 to >23,000 mg/kg (EPA, OPP 2005). Chronic toxicity to birds is also low with NOEC values ranging from 25 to 500 ppm, which were the highest test concentrations used in each study. Permethrin is toxic to honeybees, as well as other beneficial insects, through contact with residues that could occur from a broadcast application. This type of application will not be used in the LBAM eradication program.

Aquatic organisms are more sensitive to permethrin than other test organisms, based on the range of toxicity values to marine and freshwater fish and invertebrates. A large number of freshwater and marine aquatic toxicity studies have been conducted using permethrin with a result of high acute and chronic toxicity to aquatic fauna. Generally, fish are less sensitive than invertebrates with fish LC_{50} values ranging from the high parts per trillion to mid parts per billion range, depending on the species and respective life stage, study duration, and test conditions. The marine and freshwater aquatic invertebrate toxicity range is lower with reported LC_{50}/EC_{50} values ranging from the low parts per trillion to low parts per billion range (EPA, OPP, 2005; Solomon et al., 2001). Permethrin chronic

toxicity to fish and aquatic invertebrates is also high with NOEC values ranging from the low parts per trillion to low parts per billion range for fish and aquatic invertebrates, respectively.

b. Exposure and Risk

Permethrin exposure, as well as the LBAM pheromone and other materials, to human health and the environment is expected to be very low based on the unique application method for these types of treatments. The permethrin will be contained within Min-U-Gel® or a paraffin wax material that will be applied to telephone poles and trees using ground-based equipment that applies the material as a very coarse squirt from a metered hand-held wand. The direct application of this material to trees and poles eliminates the possibility of drift, and the ability of both formulations to become rainfast once the material is applied reduces any potential for run-off. In addition, applications will be made at a minimum of 8 feet from the ground to reduce accessibility by the public. The lack of drift and run-off eliminates exposure to nontarget organisms. Pheromone release from the treatments will be at extremely low levels and would be well below any concentrations that could result in effects based on the available toxicity data for mammals and other nontarget organisms that has been previously discussed. In addition, the pheromone volatilizes quickly in the atmosphere where naturally occurring pheromone already exists, further reducing the potential for exposure.

c. Summary

The use of LBAM pheromone in conjunction with permethrin in this type of treatment provides a means of controlling LBAM while greatly reducing exposure to humans and any nontarget organisms. Exposure to humans and nontarget organisms would not be expected to result in concentrations that could exceed effect levels for any of the materials that compose a male attraction station.

4. Inundative Release of *Trichogramma*

There is little environmental impact anticipated from the inundative release of *Trichogramma* wasps. Both species under consideration, *T. platneri* and *T. pretiosum*, are native to California. Both species are also readily available commercially in California where they are produced from native California stock. *Trichogramma* wasps are tiny (0.5 to 2.0 mm), nonstinging parasitoids that attack lepidopteran eggs. The preferred habitat of *T. platneri* is in trees, and the preferred habitat of *T. pretiosum* is on low-growing plants (Mills, 2002). These locations are also the primary habitats for LBAM.

The inundative approach is used to augment populations of natural enemies that are insufficient to keep pest populations below damaging

levels (Knutson, 1998). To implement the inundative approach, the targeted area is flooded with insectary-reared wasps. The released insects (*Trichogramma* wasps) control the pests (LBAM) that are present at the time of release; however, there is little expectation that the released organisms will reproduce at sufficient levels to provide long-term control (Knutson, 1998).

Inundative release of *T. platneri* and *T. pretiosum* is expected to greatly reduce numbers of LBAM, especially when used in combination with the other control methods used by the program. It will be a useful tool in areas where populations are beginning to rapidly increase or where they are already high. It also has potential for use in urban and residential areas where certain insecticide applications may not be feasible. However, because *Trichogramma* wasps are opportunistic lepidopteran egg parasites, they are expected to also attack eggs of other butterflies and moths in the release area. Therefore, it is important to ensure that releases do not occur in the vicinity of endangered or threatened lepidopterans if eggs of these species could be present. *Trichogramma* wasps have a very small flight range. One study on *T. platneri* in apple orchards indicated that its movement from a point source was limited to 15 meters (McDougall and Mills, 1997). With such limited ability to move distances, it is anticipated that reasonable buffers can be developed on a case-by-case basis to protect listed and sensitive species from egg parasitism from any inundative *Trichogramma* wasp releases. CDFA and APHIS will work closely with the U.S. Fish and Wildlife Service (FWS), as required by the Endangered Species Act, to ensure that listed butterfly species are not affected by any inundative releases of *T. platneri* or *T. pretiosum.*

Overwintering monarch butterflies, an important and fragile resource in some LBAM-infested areas, will not be impacted by the inundative release of *T. platneri* or *T. pretiosum* because monarchs overwinter as adults and would not be attacked by these wasps. In addition, monarchs will not be in a reproductive state while overwintering and, thus, will not be producing eggs that could be targeted by the wasps. However, other native butterfly and moth species that are in the vicinity of inundative releases may suffer egg parasitism if their eggs are present at the time of the wasp releases. While this parasitism is unlikely to be totally efficient at destroying all eggs, it could produce a local, temporary, population reduction of some butterfly and moth species in the release area. Any population reductions are expected to be short-lived as individuals from adjacent, untreated areas would be expected to migrate back into the area. This, however, may not be true for threatened or endangered species which is why it is critical that CDFA and APHIS consult with FWS to make sure no listed species could be impacted by a release of *Trichogramma* wasps.

Inundative release of *Trichogramma* wasps is not expected to result in any impact to human health. The wasps are tiny and do not bite or sting humans or pets.

C. Cumulative Effects

Under NEPA, Federal agencies must analyze the potential cumulative impacts of a proposed action. The Council on Environmental Quality (CEQ) defines cumulative impacts as impacts on the environment that result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions. Actions resulting in a cumulative impact may or may not be generated by the same agency. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

A combination of various treatments will be used for the duration of the program which is expected to last between 3 and 5 years, or possibly longer, depending on the success of initial eradication efforts. The use of these treatments over the duration of the eradication program is expected to result in minimal environmental effects. When these treatment options are used together in the same area, they will also have very little cumulative impact other than the eradication of LBAM from California. The proposed coordinated eradication program is likely to be more effective than relying upon the numerous, uncoordinated independent actions that would otherwise be taken by land managers when they felt it necessary for the management of individual properties. The proposed action will reduce the length of time and total number of treatments required to address the LBAM infestation and reduce potential environmental loading that could occur through the use of conventional insecticides that may pose a greater risk to human health and the environment.

LBAM eradication efforts were initiated in the fall of 2007. The first treatments were done in Napa and Oakley, California, and used a combination of Btk and pheromone twist ties. Additional, isolated population sites were identified and treated with pheromone twist ties. Isolated populations were designated based on minimal number of male moths found in the area. These areas contain few male moths and are away from the main population centers that occur in the Monterey/Seaside, Santa Cruz, and San Francisco areas. The twist ties were removed after two projected LBAM lifecycles of negative trapping.

Late last fall, the population centers near Monterey/Seaside and Santa Cruz were treated with an aerial spray of microencapsulated pheromone. The Monterey/Seaside population center was treated twice last year (once

in September with a second treatment in November). The Santa Cruz population center was treated with the microencapsulated aerial spray in October. The pheromone treatments were efficacious for 30 days.

There will be no cumulative impacts from the combination of the treatments conducted in 2007 or from future treatments because, based on the known toxicity data, specificity of the pheromones to LBAM, and the minimal risk to human health and the environment, the treatments are expected to have short-term, if any, impacts to the natural environment. Cumulative impacts to nontarget butterflies and moths from the use of pheromones are not anticipated because the pheromones are selective for LBAM and leafroller moths. Any native, nontarget leafroller populations that may be affected will quickly repopulate the area from populations in surrounding areas.

The use of male attractant treatments is expected to have minimal impact to the environment because the treatments are specially formulated to attract LBAM; only those nontarget insects that incidentally come into contact with the treatment will be affected by the pesticide. In addition, the method of application eliminates the potential for off-site transport from drift or runoff. The treatments are efficacious for 60 to 90 days and thus, after that time period, will not affect any insects that come into contact with it. There is no cumulative effect from the combination of treatments since most of the treatments are LBAM-specific. The use of permethrin, from an environmental loading perspective, would also be minor based on the current agricultural uses of permethrin. The PAN Database for 2005 lists the use of permethrin in Monterey, Santa Cruz, Santa Clara, Alameda, Contra Costa, San Francisco, and Marin Counties at 39,312 gross pounds. Based on the rate of permethrin use for the proposed treatments over a 200-square mile area, the additional use of permethrin would represent 0.8 percent of the total for the treated counties, and would actually be much less since the usage data does not include residential applications.

The use of parasitic wasps could impact some nontarget butterflies and moths since it feeds on the eggs of other nontarget Lepidoptera. The agent, however, is native to California and is relatively site-specific in its impact. Areas that are impacted by a reduction of lepidopterans are expected to recover rapidly as lepidopterans from outside the treatment area begin to repopulate release areas.

Implementation of an integrated eradication program using all of the methods discussed is not expected to result in a cumulative impact other than eradication of LBAM which is the purpose of the program. Each of the methods described is effective against different life stages of LBAM—pheromones disrupt mating of adults, male moth attractant treatments

target adult males, *Trichogamma* wasps attack eggs, and ground-applied pesticides target larvae. Except for the inundative release of *Trichogamma* wasps and ground-applied pesticide, only LBAM is expected to be impacted. While *Trichogamma* wasps will parasitize eggs of other lepidopterans, they will only be used in relatively small areas, and any lepidopteran populations that are reduced (except for LBAM) are likely to quickly recover due to immigration from adjacent populations and the fact that *Trichogamma* populations will not remain high indefinitely.

Ground applications of pesticides (Btk and spinosad) will also be used in relatively small areas where populations of lepidopterans and other nontarget insects that may have been reduced are expected to quickly rebound due to immigration from adjacent populations. There should be no long-term impacts to any nontarget species and the only cumulative effect that should occur is the eradication of LBAM.

The California Department of Pesticide Regulation pesticide use data for 2006 reports the total pounds of Btk and spinosad used in the nine LBAM infested counties to be 4,932 and 16,261 pounds, respectively. These numbers do not include over-the-counter residential uses. Based on previous use of Btk in the eradication program, the anticipated additional loading from either application is expected to be less than 0.5 percent.

D. Threatened and Endangered Species

Section 7(a)(2) of the Endangered Species Act (ESA) and its implementing regulations require all Federal agencies to insure their actions are not likely to jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of critical habitat. CDFA and APHIS are working with FWS and the National Marine Fisheries Service (NMFS) to ensure that treatment activities considered in this EA do not affect listed species or their designated or proposed critical habitats. No area will be treated until CDFA and APHIS have completed a determination of effects on listed species and their habitats in that area and, if necessary, a section 7 consultation with FWS and/or NMFS has been concluded.

APHIS has designated CDFA as its non-Federal representative for the purpose of conducting informal consultation with FWS and NMFS on APHIS activities associated with the LBAM eradication program in California. APHIS will work with CDFA to develop all necessary consultation documents and will review any assessment completed by CDFA. If a biological assessment or its equivalent is necessary, APHIS will provide CDFA with all relevant guidance for the preparation and

completion of the assessment. APHIS retains ultimate responsibility for its compliance with section 7 of the ESA.

CDFA and APHIS will continue to work in close cooperation with FWS and NMFS to ensure that potential impacts to listed species and their designated critical habitats are avoided or minimized, to the extent possible. This is consistent with the statutory and regulatory requirements of section 7 to ensure compliance with ESA throughout the development and implementation of the LBAM eradication program.

E. Other Considerations

Executive Order (EO) 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations," focuses Federal attention on the environmental and human health conditions of minority and low-income populations and promotes community access to public information and public participation in matters relating to human health or the environment. This EO requires Federal agencies to conduct their programs, policies, and activities that substantially affect human health or the environment in a manner so as not to exclude persons and populations from participation in or benefiting from such programs. It also enforces existing statutes to prevent minority and low-income populations from being subjected to disproportionately high or adverse human health or environmental effects. APHIS has determined that the environmental and human health effects from the proposed applications for treatment of LBAM in California are minimal and are not expected to have disproportionate adverse effects to any minority or low-income populations.

EO 13045, "Protection of Children from Environmental Health Risks and Safety Risks," acknowledges that children, as compared to adults, may suffer disproportionately from environmental health and safety risks because of developmental stage, greater metabolic activity levels, and behavior patterns. This EO (to the extent permitted by law and consistent with the agency's mission) requires each Federal agency to identify, assess, and address environmental health risks and safety risks that may disproportionately affect children. Applications of insecticide will be made using ground equipment which will minimize off-site movement of any material and care will be taken to minimize any potential for exposure of children to LBAM treatments. The lack of toxic effects from the use of pheromones coupled with their low application rate make it unlikely that children will be adversely impacted by pheromone applications. In addition, public notification of any aerial spraying activities will allow all those with concerns to insure that they remain inside and away from potential spray sites. The low potential for exposure and low toxicity of the pheromone makes it very unlikely that children will suffer a

disproportionate, or any, health impact attributable to the LBAM eradication program.

IV. Listing of Agencies and Persons Consulted

U.S. Fish and Wildlife Service
Ventura Fish & Wildlife Office
2493 Portola Road, Suite B
Ventura, CA 93003

National Marine Fisheries Service
Southwest Regional Office
501 West Ocean Blvd, Suite 4200
Long Beach, CA 90802–4213

U.S. Department of Agriculture
Animal Plant Health Inspection Service
Plant Protection and Quarantine
Emergency and Domestic Programs
4700 River Road Unit 134
Riverdale, MD 20737

U.S. Department of Agriculture
Animal and Plant Health Inspection Service
Policy and Program Development
Environmental Services
4700 River Road Unit 149
Riverdale, MD 20737

California Department of Food and Agriculture
Plant Health and Pest Prevention Services
1220 N Street
Sacramento, CA 95814–5607

California Environmental Protection Agency
Central Coast Regional Water Quality Control Board
895 Aerovista Place, Suite 101
San Luis Obispo, CA 93401

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Appendix A. Light Brown Apple Moth Host List

Genus Species	Common Name	Genus Match Host Prevalence
Abelia spp.	abelia	Occasional
Abies	fir	Common
Abies ×shastensis	Shasta red fir	Common
Abies amabilis	Pacific silver fir	Common
Abies bracteata	bristlecone fir	Common
Abies concolor	white fir	Common
Abies grandis	grand fir	Common
Abies lasiocarpa	subalpine fir	Common
Abies lowiana		Common
Abies magnifica	California red fir	Common
Abies procera	noble fir	Common
Abies spp.	fir	Common
Acacia	acacia	Common
Acacia baileyana	cootamundra wattle	Common
Acacia cyclops	cyclops acacia	Common
Acacia dealbata	silver wattle	Common
Acacia decurrens	green wattle	Common
Acacia elata	cedar wattle	Common
Acacia farnesiana	sweet acacia	Common
Acacia greggii	catclaw acacia	Common
Acacia longifolia		Common
Acacia mearnsii	black wattle	Common
Acacia melanoxylon	blackwood	Common
Acacia paradoxa	paradox acacia	Common
Acacia podalyriifolia	pearl wattle	Common
Acacia pycnantha	golden wattle	Common
Acacia redolens	bank catclaw	Common
Acacia retinodes	water wattle	Common
Acacia saligna	orange wattle	Common
Acacia spp.	acacias	Common
Acacia verticillata	prickly Moses	Common
Acer	maple	
Acer campestre	hedge maple	
Acer circinatum	vine maple	
Acer glabrum	Douglas maple	
Acer glabrum	Greene's maple	
Acer glabrum	Rocky Mountain maple	
Acer glabrum	Torrey maple	
Acer macrophyllum	bigleaf maple	
Acer negundo	boxelder	
Acer negundo	California boxelder	
Acer saccharinum	silver maple	
Acer spp.	maple	
Achillea	yarrow	Common
Achillea filipendulina	fernleaf yarrow	Common

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Achillea millefolium	California yarrow	Common
Achillea millefolium	common yarrow	Common
Achillea millefolium	giant yarrow	Common
Achillea millefolium	Pacific yarrow	Common
Achillea millefolium	western yarrow	Common
Achillea spp.	yarrow	Common
Acmena spp.	lilly-pily tree	Occasional
Actinidia spp.	Chinese gooseberry, kiwi, kiwifruit	Primary
Adiantum	maidenhair fern	Occasional
Adiantum ×tracyi		Occasional
Adiantum aleuticum	Aleutian maidenhair	Occasional
Adiantum capillus-veneris	common maidenhair	Occasional
Adiantum jordanii	California maidenhair	Occasional
Adiantum spp.	maidenhair ferns	Occasional
Aesculus	buckeye	Occasional
Aesculus californica	California buckeye	Occasional
Aesculus spp.	horse chestnut, buckeye	Occasional
Alnus	alder	
Alnus cordata	Italian alder	
Alnus incana	gray alder	
Alnus incana	thinleaf alder	
Alnus rhombifolia	White Alder	
Alnus rubra	red alder	
Alnus spp.	Alder	
Alnus viridis	green alder	
Alnus viridis	Siberian alder	
Alnus viridis	Sitka alder	
Amaranthus	pigweed	Occasional
Amaranthus albus	prostrate pigweed	Occasional
Amaranthus arenicola	sandhill amaranth	Occasional
Amaranthus blitoides	mat amaranth	Occasional
Amaranthus blitum		Occasional
Amaranthus blitum	purple amaranth	Occasional
Amaranthus californicus	California amaranth	Occasional
Amaranthus caudatus	love-lies-bleeding	Occasional
Amaranthus cruentus	red amaranth	Occasional
Amaranthus deflexus	largefruit amaranth	Occasional
Amaranthus fimbriatus	fringed amaranth	Occasional
Amaranthus hybridus	slim amaranth	Occasional
Amaranthus hypochondriacus	Prince-of-Wales feather	Occasional
Amaranthus palmeri	carelessweed	Occasional
Amaranthus powellii		Occasional
Amaranthus powellii	Powell's amaranth	Occasional
Amaranthus retroflexus	redroot amaranth	Occasional
Amaranthus spinosus	spiny amaranth	Occasional
Amaranthus spp.		Occasional

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Amaranthus torreyi	Torrey's amaranthus	Occasional
Amaranthus tuberculatus	roughfruit amaranth	Occasional
Amaranthus watsonii	Watson's amaranth	Occasional
Antirrhinum	snapdragon	Occasional
Antirrhinum majus	garden snapdragon	Occasional
Antirrhinum spp.	snapdragons	Occasional
Apium	celery	Occasional
Apium graveolens	wild celery	Occasional
Apium nodiflorum	European marshwort	Occasional
Apium spp.	Celery	Occasional
Aquilegia	columbine	Common
Aquilegia eximia	Van Houtte's columbine	Common
Aquilegia formosa	western columbine	Common
Aquilegia pubescens	Sierra columbine	Common
Aquilegia shockleyi		Common
Aquilegia spp.	Columbines	Common
Arbutus	madrone	Common
Arbutus menziesii	Pacific madrone	Common
Arbutus spp.	Strawberry Tree	Common
Arctostaphylos	manzanita	
Arctostaphylos ×benitoensis		
Arctostaphylos ×campbelliae		
Arctostaphylos ×cinerea	Waldo manzanita	
Arctostaphylos ×helleri		
Arctostaphylos ×jepsonii		
Arctostaphylos ×laxiflora		
Arctostaphylos ×media		
Arctostaphylos ×parvifolia		
Arctostaphylos ×repens	PMC manzanita	
Arctostaphylos andersonii	Santa Cruz manzanita	
Arctostaphylos auriculata	Mount Diablo manzanita	
Arctostaphylos bakeri	Baker's manzanita	
Arctostaphylos bakeri	The Cedars manzanita	
Arctostaphylos canescens	hoary manzanita	
Arctostaphylos canescens	Sonoma manzanita	
Arctostaphylos catalinae	Santa Catalina Island manzanita	
Arctostaphylos columbiana	hairy manzanita	
Arctostaphylos confertiflora	Santa Rosa Island manzanita	
Arctostaphylos cruzensis	La Cruz manzanita	
Arctostaphylos densiflora	Vine Hill manzanita	
Arctostaphylos edmundsii	Little Sur manzanita	
Arctostaphylos gabrielensis	San Gabriel manzanita	
Arctostaphylos glandulosa	Adams' manzanita	
Arctostaphylos glandulosa	Del Mar manzanita	
Arctostaphylos glandulosa	Eastwood's manzanita	
Arctostaphylos glandulosa	Zaca's manzanita	

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Arctostaphylos glauca	bigberry manzanita	
Arctostaphylos glutinosa	Schreiber's manzanita	
Arctostaphylos hispidula	Gasquet manzanita	
Arctostaphylos hookeri	Franciscan manzanita	
Arctostaphylos hookeri	Hearst's manzanita	
Arctostaphylos hookeri	Hooker's manzanita	
Arctostaphylos hookeri	Mt. Tamalpais manzanita	
Arctostaphylos hookeri	Presidio manzanita	
Arctostaphylos hooveri	Hoover's manzanita	
Arctostaphylos imbricata	San Bruno Mountain manzanita	
Arctostaphylos insularis	island manzanita	
Arctostaphylos klamathensis	Klamath manzanita	
Arctostaphylos luciana	Santa Lucia manzanita	
Arctostaphylos malloryi	Mallory's manzanita	
Arctostaphylos manzanita	Contra Costa manzanita	
Arctostaphylos manzanita	Konocti manzanita	
Arctostaphylos manzanita	Roof's manzanita	
Arctostaphylos manzanita	whiteleaf manzanita	
Arctostaphylos manzanita	Wieslander's manzanita	
Arctostaphylos mendocinoensis	pygmy manzanita	
Arctostaphylos mewukka	Indian manzanita	
Arctostaphylos mewukka	True's manzanita	
Arctostaphylos montaraensis	Montara manzanita	
Arctostaphylos montereyensis	Monterey manzanita	
Arctostaphylos morroensis	Morro manzanita	
Arctostaphylos myrtifolia	Ione manzanita	
Arctostaphylos nevadensis	pinemat manzanita	
Arctostaphylos nissenana	Nissenan manzanita	
Arctostaphylos nortensis	Del Norte manzanita	
Arctostaphylos nummularia	glossyleaf manzanita	
Arctostaphylos obispoensis	serpentine manzanita	
Arctostaphylos osoensis	Oso manzanita	
Arctostaphylos otayensis	Otay manzanita	
Arctostaphylos pacifica	Pacific manzanita	
Arctostaphylos pajaroensis	Pajaro manzanita	
Arctostaphylos pallida	Alameda manzanita	
Arctostaphylos parryana	Parry manzanita	
Arctostaphylos patula	greenleaf manzanita	
Arctostaphylos pechoensis	Pecho manzanita	
Arctostaphylos peninsularis	Peninsular manzanita	
Arctostaphylos pilosula	La Panza manzanita	
Arctostaphylos pringlei	pinkbracted manzanita	
Arctostaphylos pringlei	Pringle manzanita	
Arctostaphylos pumila	sandmat manzanita	
Arctostaphylos pungens	pointleaf manzanita	
Arctostaphylos purissima	La Purissima manzanita	

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Arctostaphylos rainbowensis	Rainbow manzanita	
Arctostaphylos refugioensis	Refugio manzanita	
Arctostaphylos regismontana	Kings Mountain manzanita	
Arctostaphylos rudis	shagbark manzanita	
Arctostaphylos silvicola	Bonny Doon manzanita	
Arctostaphylos spp.	Manzanita	
Arctostaphylos stanfordiana	Raiche's manzanita	
Arctostaphylos stanfordiana	Rincon manzanita	
Arctostaphylos stanfordiana	Stanford's manzanita	
Arctostaphylos tomentosa	brittleleaf manzanita	
Arctostaphylos tomentosa	dacite manzanita	
Arctostaphylos tomentosa	rosy manzanita	
Arctostaphylos tomentosa	Santa Cruz Island manzanita	
Arctostaphylos tomentosa	woollyleaf manzanita	
Arctostaphylos uva-ursi	kinnikinnick	
Arctostaphylos virgata	Bolinas manzanita	
Arctostaphylos viridissima	whitehair manzanita	
Arctostaphylos viscida	Mariposa manzanita	
Arctostaphylos viscida	sticky whiteleaf manzanita	
Arctostaphylos wellsii	Wells' manzanita	
Arctotheca	Capeweed	Common
Arctotheca calendula	Capeweed	Common
Arctotheca spp.	capeweeds, cape dandelion	Common
Arctotis	arctotis	Common
Arctotis spp.	African daisy	Common
Arctotis stoechadifolia	African daisy	Common
Aronia melanocarpa	Chokeberry	
Artemisia	sagebrush	Common
Artemisia annua	sweet sagewort	Common
Artemisia arbuscula	little sagebrush	Common
Artemisia arctica	boreal sagebrush	Common
Artemisia biennis	biennial wormwood	Common
Artemisia bigelovii	Bigelow sage	Common
Artemisia californica	coastal sagebrush	Common
Artemisia campestris	field sagewort	Common
Artemisia cana	silver sagebrush	Common
Artemisia douglasiana	Douglas' sagewort	Common
Artemisia dracunculus	tarragon	Common
Artemisia lindleyana	Columbia River wormwood	Common
Artemisia ludoviciana	white sagebrush	Common
Artemisia michauxiana	Michaux's wormwood	Common
Artemisia nesiotica	island sagebrush	Common
Artemisia norvegica		Common
Artemisia nova	black sagebrush	Common
Artemisia palmeri	San Diego sagewort	Common
Artemisia pycnocephala	beach wormwood	Common

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Artemisia rothrockii	timberline sagebrush	Common
Artemisia spinescens		Common
Artemisia spp.		Common
Artemisia suksdorfii	coastal wormwood	Common
Artemisia tridentata	basin big sagebrush	Common
Artemisia tridentata	big sagebrush	Common
Artemisia tridentata	mountain big sagebrush	Common
Artemisia tridentata	Wyoming big sagebrush	Common
Artemisia vulgaris	common wormwood	Common
Asparagus	asparagus	Occasional
Asparagus asparagoides	African asparagus fern	Occasional
Asparagus densiflorus	Sprenger's asparagus fern	Occasional
Asparagus officinalis	garden asparagus	Occasional
Asparagus setaceus	common asparagus fern	Occasional
Asparagus spp.	asparagus, asparagus fern, smilax asparagus	Occasional
Astartea spp.		
Aster intricatus		Common
Aster spp.	asters	Common
Athyrium	ladyfern	
Athyrium americanum	alpine ladyfern	
Athyrium distentifolium		
Athyrium filix'femina	Lady Fern	
Athyrium filix-femina	common ladyfern	
Athyrium filix-femina	subarctic ladyfern	
Aucuba spp.	aucuba, Himalaya laurel, Japanese laurel	Occasional
Azara microphylla	Boxleaf Azara	
Baccharis	baccharis	Common
Baccharis brachyphylla	shortleaf baccharis	Common
Baccharis douglasii	saltmarsh baccharis	Common
Baccharis emoryi	Emory's baccharis	Common
Baccharis glutinosa		Common
Baccharis malibuensis	Malibu baccharis	Common
Baccharis pilularis	coyotebrush	Common
Baccharis plummerae	Plummer's baccharis	Common
Baccharis plummerae	smooth baccharis	Common
Baccharis salicifolia	mule's fat	Common
Baccharis sarothroides	desertbroom	Common
Baccharis sergiloides	desert baccharis	Common
Baccharis spp.	coyote brush, desert broom	Common
Baccharis vanessae	Encinitis false willow	Common
Banksia spp.	candle flowers	Common
Begonia spp.	begonia	Occasional
Berberis	barberry	Occasional
Berberis aquifolium		Occasional
Berberis darwinii	Darwin's berberis	Occasional
Berberis fremontii		Occasional

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Berberis haematocarpa		Occasional
Berberis nervosa		Occasional
Berberis nevinii		Occasional
Berberis pinnata		Occasional
Berberis pumila		Occasional
Berberis repens		Occasional
Berberis spp.	barberry	Occasional
Beta	beet	Occasional
Beta spp.	beet	Occasional
Beta vulgaris	common beet	Occasional
Betula	birch	Occasional
Betula glandulosa	resin birch	Occasional
Betula jacquemontii	birch	Occasional
Betula nana	dwarf birch	Occasional
Betula occidentalis	water birch	Occasional
Betula pumila	bog birch	Occasional
Betula spp.	birch	Occasional
Blandfordia spp.	Christmas bells	
Boronia spp.	boronias	Common
Brassica	mustard	Occasional
Brassica fruticulosa	Mediterranean cabbage	Occasional
Brassica juncea	India mustard	Occasional
Brassica napus	rape	Occasional
Brassica nigra	black mustard	Occasional
Brassica oleracea	cabbage	Occasional
Brassica rapa	field mustard	Occasional
Brassica spp.	broccoli, cauliflower, cabbage, cress, kale, mustard, etc.	Occasional
Brassica tournefortii	Asian mustard	Occasional
Breynia spp.	snow bush	Occasional
Bromus	brome	Occasional
Bromus alopecuros	weedy brome	Occasional
Bromus anomalus		Occasional
Bromus arenarius	Australian brome	Occasional
Bromus arizonicus	Arizona brome	Occasional
Bromus arvensis	field brome	Occasional
Bromus berteroanus	Chilean chess	Occasional
Bromus briziformis	rattlesnake brome	Occasional
Bromus carinatus	California brome	Occasional
Bromus catharticus	rescuegrass	Occasional
Bromus ciliatus	fringed brome	Occasional
Bromus ciliatus	fringed brome	Occasional
Bromus diandrus	ripgut brome	Occasional
Bromus erectus	erect brome	Occasional
Bromus grandis	tall brome	Occasional
Bromus hordeaceus	soft brome	Occasional
Bromus inermis	smooth brome	Occasional

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Bromus laevipes	Chinook brome	Occasional
Bromus marginatus	mountain brome	Occasional
Bromus maritimus	seaside brome	Occasional
Bromus matritensis	compact brome	Occasional
Bromus orcuttianus	Orcutt's brome	Occasional
Bromus pacificus		Occasional
Bromus polyanthus	Great Basin brome	Occasional
Bromus porteri	Porter brome	Occasional
Bromus pseudolaevipes	coast range brome	Occasional
Bromus racemosus	bald brome	Occasional
Bromus richardsonii		Occasional
Bromus rubens	red brome	Occasional
Bromus scoparius	broom brome	Occasional
Bromus secalinus		Occasional
Bromus secalinus	rye brome	Occasional
Bromus sitchensis	Alaska brome	Occasional
Bromus spp.	brome, bromegrass, chess, foxtail, rescuegrass	Occasional
Bromus stamineus	roadside brome	Occasional
Bromus sterilis	poverty brome	Occasional
Bromus subvelutinus	hoary brome	Occasional
Bromus suksdorfii	Suksdorf's brome	Occasional
Bromus tectorum	cheatgrass	Occasional
Bromus vulgaris	Columbia brome	Occasional
Buddleia spp.	butterfly bush	
Buddleja	butterflybush	Common
Buddleja davidii	orange eye butterflybush	Common
Buddleja saligna	squarestem butterflybush	Common
Buddleja utahensis	Utah butterflybush	Common
Bursaria spp.	black thorns, prickly box	
Calendula	Marigold	Common
Calendula arvensis	field marigold	Common
Calendula officinalis	pot marigold	Common
Calendula spp.	calendula, marigold	Common
Callistemon spp.		Occasional
Camellia spp.	Camellia	Occasional
Campsis	Campsis	Occasional
Campsis radicans	trumpet creeper	Occasional
Campsis spp.	trumpet creeper, trumpet vine	Occasional
Capsella	Capsella	Occasional
Capsella bursa-pastoris	shepherd's purse	Occasional
Capsella spp.	shepard’s purse	Occasional
Capsicum	pepper	Occasional
Capsicum annuum	cayenne pepper	Occasional
Capsicum spp.	pepper	Occasional
Carduus	plumeless thistle	Common
Carduus acanthoides	spiny plumeless thistle	Common

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Carduus nutans	nodding plumeless thistle	Common
Carduus pycnocephalus	Italian plumeless thistle	Common
Carduus spp.		Common
Carduus tenuiflorus	winged plumeless thistle	Common
Carmichaelia spp.		Very Common
Carpobrotus	carpobrotus	
Carpobrotus chilensis	sea fig	
Carpobrotus edulis	hottentot fig	
Carpobrotus spp.		
Cassia spp.	golden shower, pink shower, rainbow shower, gold medallion tree	Very Common
Ceanothus	Ceanothus	Occasional
Ceanothus ×arcuatus		Occasional
Ceanothus ×bakeri		Occasional
Ceanothus ×flexilis	flexible ceanothus	Occasional
Ceanothus ×lobbianus		Occasional
Ceanothus ×lorenzenii		Occasional
Ceanothus ×mendocinensis	Mendocino ceanothus	Occasional
Ceanothus ×otayensis		Occasional
Ceanothus ×rugosus		Occasional
Ceanothus ×serrulatus	Cascade Lake ceanothus	Occasional
Ceanothus ×vanrensselaeri		Occasional
Ceanothus ×veitchianus		Occasional
Ceanothus arboreus	feltleaf ceanothus	Occasional
Ceanothus confusus	Rincon Ridge ceanothus	Occasional
Ceanothus connivens	trailing buckbrush	Occasional
Ceanothus cordulatus	whitethorn ceanothus	Occasional
Ceanothus crassifolius	hoaryleaf ceanothus	Occasional
Ceanothus cuneatus	Buckbrush	Occasional
Ceanothus cuneatus	Monterey ceanothus	Occasional
Ceanothus cuneatus	sedgeleaf buckbrush	Occasional
Ceanothus cyaneus	San Diego buckbrush	Occasional
Ceanothus dentatus	sandscrub ceanothus	Occasional
Ceanothus divergens	Calistoga ceanothus	Occasional
Ceanothus diversifolius	pinemat	Occasional
Ceanothus ferrisiae	Coyote ceanothus	Occasional
Ceanothus foliosus	Vine Hill ceanothus	Occasional
Ceanothus foliosus	wavyleaf buckbrush	Occasional
Ceanothus foliosus	wavyleaf ceanothus	Occasional
Ceanothus fresnensis	Fresno mat	Occasional
Ceanothus gloriosus	Mt. Vision ceanothus	Occasional
Ceanothus gloriosus	Point Reyes ceanothus	Occasional
Ceanothus greggii	desert ceanothus	Occasional
Ceanothus greggii	Mojave ceanothus	Occasional
Ceanothus griseus	Carmel ceanothus	Occasional
Ceanothus hearstiorum	Hearst Ranch buckbrush	Occasional
Ceanothus impressus	Santa Barbara ceanothus	Occasional

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Ceanothus incanus	coast whitethorn	Occasional
Ceanothus integerrimus	deerbrush	Occasional
Ceanothus jepsonii	Jepson ceanothus	Occasional
Ceanothus lemmonii	Lemmon's ceanothus	Occasional
Ceanothus leucodermis	chaparral whitethorn	Occasional
Ceanothus maritimus	maritime ceanothus	Occasional
Ceanothus masonii	Mason's ceanothus	Occasional
Ceanothus megacarpus	bigpod ceanothus	Occasional
Ceanothus megacarpus	island ceanothus	Occasional
Ceanothus oliganthus	hairy ceanothus	Occasional
Ceanothus ophiochilus	Vail Lake ceanothus	Occasional
Ceanothus palmeri	Palmer ceanothus	Occasional
Ceanothus papillosus	wartleaf ceanothus	Occasional
Ceanothus parryi	Parry ceanothus	Occasional
Ceanothus parvifolius	littleleaf ceanothus	Occasional
Ceanothus pinetorum	Coville ceanothus	Occasional
Ceanothus prostratus	prostrate ceanothus	Occasional
Ceanothus pumilus	dwarf ceanothus	Occasional
Ceanothus purpureus	hollyleaf ceanothus	Occasional
Ceanothus roderickii	Pine Hill buckbrush	Occasional
Ceanothus sanguineus	redstem ceanothus	Occasional
Ceanothus sonomensis	Sonoma ceanothus	Occasional
Ceanothus sorediatus	jimbrush	Occasional
Ceanothus spinosus	redheart	Occasional
Ceanothus spp.	buck brush, wild lilac	Occasional
Ceanothus thyrsiflorus	Blueblossom	Occasional
Ceanothus tomentosus	woolyleaf ceanothus	Occasional
Ceanothus velutinus	Hooker's ceanothus	Occasional
Ceanothus velutinus	snowbrush ceanothus	Occasional
Ceanothus verrucosus	barranca brush	Occasional
Cedrus spp.	cedar	
Centranthus	centranthus	Occasional
Centranthus ruber	red valerian	Occasional
Ceratostigma spp.	Chinese plumbago	Occasional
Cestrum	jessamine	
Cestrum elegans	Cestrum	
Cestrum fasciculatum	early Jessamine	
Cestrum nocturnum	night Jessamine	
Cestrum parqui	Chilean jessamine	
Chaenomeles spp.	Flowering Quince	Very Common
Chamaecyparis	cedar	Occasional
Chamaecyparis lawsoniana	Port Orford cedar	Occasional
Chamaecyparis spp.	false cypress, Port Orford cedar	Occasional
Chenopodium	Goosefoot	Occasional
Chenopodium album	Lambsquarters	Occasional
Chenopodium album	lateflowering goosefoot	Occasional

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Chenopodium album	Missouri lambsquarters	Occasional
Chenopodium album	Stevens' lambsquarters	Occasional
Chenopodium ambrosioides	Mexican tea	Occasional
Chenopodium atrovirens	pinyon goosefoot	Occasional
Chenopodium berlandieri	pitseed goosefoot	Occasional
Chenopodium berlandieri	Zschack's goosefoot	Occasional
Chenopodium botrys	Jerusalem oak goosefoot	Occasional
Chenopodium californicum	California goosefoot	Occasional
Chenopodium capitatum	blite goosefoot	Occasional
Chenopodium carnosulum	ridged goosefoot	Occasional
Chenopodium chenopodioides	low goosefoot	Occasional
Chenopodium desiccatum	aridland goosefoot	Occasional
Chenopodium foliosum	leafy goosefoot	Occasional
Chenopodium fremontii	Fremont's goosefoot	Occasional
Chenopodium hians	hians goosefoot	Occasional
Chenopodium humile	marshland goosefoot	Occasional
Chenopodium incanum	mealy goosefoot	Occasional
Chenopodium leptophyllum	narrowleaf goosefoot	Occasional
Chenopodium macrospermum	largeseed goosefoot	Occasional
Chenopodium macrospermum	saltloving goosefoot	Occasional
Chenopodium multifidum	cutleaf goosefoot	Occasional
Chenopodium murale	nettleleaf goosefoot	Occasional
Chenopodium nevadense	Nevada goosefoot	Occasional
Chenopodium opulifolium	seaport goosefoot	Occasional
Chenopodium overi	Over's goosefoot	Occasional
Chenopodium polyspermum	manyseed goosefoot	Occasional
Chenopodium pratericola	desert goosefoot	Occasional
Chenopodium pumilio	clammy goosefoot	Occasional
Chenopodium rubrum	red goosefoot	Occasional
Chenopodium salinum	Rocky Mountain goosefoot	Occasional
Chenopodium simplex	mapleleaf goosefoot	Occasional
Chenopodium spp.	fat-hen. lamb’s quarters	Occasional
Chenopodium vulvaria	stinking goosefoot	Occasional
Chenopodium watsonii	Watson's goosefoot	Occasional
Chimonanthus spp.	Japanese allspice, wintersweet	Occasional
Choisya spp.	Mexican orange	Common
Choisya ternata	Mexican orange	Common
Chrysanthemum	Daisy	Common
Chrysanthemum ×morifolium	florist's daisy	Common
Chrysanthemum maxium	Shasta Daisy	Common
Chrysanthemum spp.	chrysanthemums	Common
Chrysanthemum x	morifolium (florist mums)	Common
Cirsium	thistle	Common
Cirsium andersonii	rose thistle	Common
Cirsium andrewsii	Franciscan thistle	Common
Cirsium arizonicum	Arizona thistle	Common
Cirsium arvense	Canada thistle	Common

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Cirsium brevistylum	clustered thistle	Common
Cirsium canescens		Common
Cirsium canovirens	graygreen thistle	Common
Cirsium ciliolatum	Ashland thistle	Common
Cirsium crassicaule	slough thistle	Common
Cirsium cymosum	peregrine thistle	Common
Cirsium douglasii	Douglas' thistle	Common
Cirsium fontinale	Chorro Creek Bog thistle	Common
Cirsium fontinale	fountain thistle	Common
Cirsium fontinale	Mt. Hamilton thistle	Common
Cirsium hydrophilum	Suisun thistle	Common
Cirsium hydrophilum	Vasey's thistle	Common
Cirsium inamoenum		Common
Cirsium loncholepis	la graciosa thistle	Common
Cirsium mohavense	Mojave thistle	Common
Cirsium neomexicanum	New Mexico thistle	Common
Cirsium occidentale	cobwebby thistle	Common
Cirsium occidentale	compact cobwebby thistle	Common
Cirsium occidentale	snowy thistle	Common
Cirsium ochrocentrum	yellowspine thistle	Common
Cirsium praeteriens	Palo Alto thistle	Common
Cirsium quercetorum	Alameda County thistle	Common
Cirsium remotifolium	fewleaf thistle	Common
Cirsium rhothophilum	surf thistle	Common
Cirsium scabrum	rough thistle	Common
Cirsium scariosum	meadow thistle	Common
Cirsium spp.	Arizona thistle, bull thistle, Canada thistle	Common
Cirsium subniveum	Jackson Hole thistle	Common
Cirsium undulatum	wavyleaf thistle	Common
Cirsium vulgare	bull thistle	Common
Citrus Limon	Lemon	Common
Citrus paradisiaca	Grapefruit	Common
Citrus sinensis	Washington Navel	Common
Citrus spp.	Citrus	Common
Clematis	leather flower	Common
Clematis drummondii		Common
Clematis lasiantha	pipestem clematis	Common
Clematis ligusticifolia	California clematis	Common
Clematis ligusticifolia	western white clematis	Common
Clematis pauciflora	ropevine clematis	Common
Clematis spp.	clematis, virgin’s bower, lather flower, vase vine	Common
Clematis terniflora	sweet autumn virginsbower	Common
Clematis vitalba	evergreen clematis	Common
Clerodendron spp.		
Clethra spp.	white alder, summer-sweet	Occasional
Clianthus spp.	desert pea, glory pea, parrot’s-beak	Very Common

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Convolvulus	Bindweed	Occasional
Convolvulus althaeoides	mallow bindweed	Occasional
Convolvulus arvensis	field bindweed	Occasional
Convolvulus equitans	Texas bindweed	Occasional
Convolvulus spp.	field bindweed, dwarf morning-glory	Occasional
Convolvulus tricolor	dwarf morning-glory	Occasional
Conyza	horseweed	Common
Conyza bonariensis	asthmaweed	Common
Conyza canadensis	Canadian horseweed	Common
Conyza floribunda	asthmaweed	Common
Conyza spp.	fleabane, horsethistle	Common
Coprosma	mirrorplant	
Coprosma repens	creeping mirrorplant	
Coprosma spp.		
Cordyline	Cordyline	Occasional
Cordyline australis	cabbage tree	Occasional
Cordyline spp.	cabbage tree, dracaena, good-luck plant	Occasional
Coriaria spp.	tanner’s tree	Occasional
Cornus	dogwood	
Cornus canadensis		
Cornus glabrata	brown dogwood	
Cornus nuttallii	Pacific dogwood	
Cornus sericea	redosier dogwood	
Cornus sericea	western dogwood	
Cornus sessilis	blackfruit dogwood	
Cornus unalaschkensis	western cordilleran bunchberry	
Correa spp.	Carmine Bells	Common
Cotoneaster	cotoneaster	Very Common
Cotoneaster franchetii	orange cotoneaster	Very Common
Cotoneaster lacteus	milkflower cotoneaster	Very Common
Cotoneaster pannosus	silverleaf cotoneaster	Very Common
Cotoneaster spp.	Cotoneaster	Very Common
Crataegus	hawthorn	Very Common
Crataegus douglasii	black hawthorn	Very Common
Crataegus monogyna	oneseed hawthorn	Very Common
Crataegus spp.	Hawthorn	Very Common
Crataegus suksdorfii	Suksdorf's hawthorn	Very Common
Crocosmia	crocosmia	Common
Crocosmia ×crocosmiiflora	montbretia	Common
Crocosmia spp.	Montbretia	Common
Cryptomeria spp.	Japanese cedar	
Cryptostemma spp.	capeweed	Common
Cucumis	melon	
Cucumis anguria	West Indian gherkin	
Cucumis melo	cantaloupe	
Cucumis myriocarpus	gooseberry gourd	

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Cucumis spp.	cantaloupe, cucumber, melon, muskmelon	
Cucurbita	Gourd	Occasional
Cucurbita digitata	fingerleaf gourd	Occasional
Cucurbita ficifolia	figleaf gourd	Occasional
Cucurbita foetidissima	Missouri gourd	Occasional
Cucurbita palmata	coyote gourd	Occasional
Cucurbita pepo	field pumpkin	Occasional
Cucurbita pepo		Occasional
Cucurbita spp.	gourds, pumpkins, squashes	Occasional
Cupressus	cypress	Occasional
Cupressus abramsiana	Santa Cruz Island cypress	Occasional
Cupressus arizonica	Arizona cypress	Occasional
Cupressus arizonica	Cuyamaca cypress	Occasional
Cupressus arizonica	Paiute cypress	Occasional
Cupressus bakeri	Modoc cypress	Occasional
Cupressus forbesii	tecate cypress	Occasional
Cupressus goveniana	Gowen cypress	Occasional
Cupressus goveniana	pygmy cypress	Occasional
Cupressus guadalupensis		Occasional
Cupressus macnabiana	MacNab's cypress	Occasional
Cupressus macrocarpa	Monterey cypress	Occasional
Cupressus nootkatensis	Alaska cedar	Occasional
Cupressus sargentii	Sargent's cypress	Occasional
Cupressus spp.	cypress	Occasional
Cydonia	cydonia	Very Common
Cydonia oblonga	quince	Very Common
Cydonia spp.	quince	Very Common
Cyphomandra spp.	tamarillo, tree tomato, tomato tree	
Cytisus	broom	Very Common
Cytisus ×dallimorei		Very Common
Cytisus multiflorus	white spanishbroom	Very Common
Cytisus scoparius	Scotch broom	Very Common
Cytisus spp.	genista, Scotch broom, Spanish broom, white Spanish	Very Common
Cytisus striatus	striated broom	Very Common
Dahlia spp.	dahlia	Common
Datura	jimsonweed	Occasional
Datura discolor	desert thorn-apple	Occasional
Datura inoxia	pricklyburr	Occasional
Datura quercifolia	Chinese thorn-apple	Occasional
Datura spp.	angel’s trumpet, Jimson weed, thorn apple	Occasional
Datura stramonium	jimsonweed	Occasional
Datura wrightii	sacred thorn-apple	Occasional
Daucus	wild carrot	Occasional
Daucus carota	Queen Anne's lace	Occasional
Daucus pusillus	American wild carrot	Occasional
Daucus spp.	carrot, Queen Anne’s lace	Occasional

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Dendromecon	tree poppy	
Dendromecon californica	Bush Poppy	
Dendromecon harfordii	Harford's tree poppy	
Dendromecon rigida	tree poppy	
Deutzia spp.	Deutzia	Occasional
Diospyros	Diospyros	Occasional
Diospyros spp.	ebony, persimmon	Occasional
Diospyros virginiana	common persimmon	Occasional
Dodonaea	dodonaea	Occasional
Dodonaea spp.	hop bush, hopseed bush	Occasional
Dodonaea viscosa	Florida hopbush	Occasional
Duchesnea	duchesnea	Very Common
Duchesnea indica	Indian strawberry	Very Common
Elaeagnus	elaeagnus	
Elaeagnus angustifolia	Russian olive	
Elaeagnus pungens	Silberberry	
Epilobium	willowherb	
Epilobium anagallidifolium	pimpernel willowherb	
Epilobium brachycarpum	tall annual willowherb	
Epilobium canum	hummingbird trumpet	
Epilobium ciliatum	fringed willowherb	
Epilobium clavatum	talus willowherb	
Epilobium cleistogamum	selfing willowherb	
Epilobium densiflorum	denseflower willowherb	
Epilobium foliosum	California willowherb	
Epilobium glaberrimum	glaucus willowherb	
Epilobium halleanum	glandular willowherb	
Epilobium hornemannii	Hornemann's willowherb	
Epilobium howellii	Yuba Pass willowherb	
Epilobium lactiflorum	milkflower willowherb	
Epilobium leptophyllum	bog willowherb	
Epilobium luteum	yellow willowherb	
Epilobium minutum	chaparral willowherb	
Epilobium nivium	Snow Mountain willowherb	
Epilobium obcordatum	rockfringe	
Epilobium oreganum	Grants Pass willowherb	
Epilobium oregonense	Oregon willowherb	
Epilobium pallidum	largeflower spike-primrose	
Epilobium palustre	marsh willowherb	
Epilobium pygmaeum	smooth spike-primrose	
Epilobium rigidum	stiff willowherb	
Epilobium saximontanum	Rocky Mountain willowherb	
Epilobium septentrionale	northern willowherb	
Epilobium siskiyouense	Siskiyou willowherb	
Epilobium spp.	fireweed	
Epilobium torreyi	Torrey's willowherb	

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Erica	heath	Common
Erica lusitanica	Spanish heath	Common
Erica spp.	heath, heather	Common
Eriobotrya	loquat	Very Common
Eriobotrya japonica	loquat	Very Common
Eriobotrya spp.	loquat	Very Common
Eriostemon spp.	pink star, wax flower	Common
Erodium	stork's bill	Occasional
Erodium botrys	longbeak stork's bill	Occasional
Erodium brachycarpum	shortfruit stork's bill	Occasional
Erodium cicutarium	redstem stork's bill	Occasional
Erodium cygnorum	Australian stork's bill	Occasional
Erodium macrophyllum	California stork's bill	Occasional
Erodium macrophyllum	roundleaf stork's bill	Occasional
Erodium malacoides	Mediterranean stork's bill	Occasional
Erodium moschatum	musky stork's bill	Occasional
Erodium spp.	cranesbill, filaree	Occasional
Erodium texanum	Texas stork's bill	Occasional
Escallonia	redclaws	Occasional
Escallonia compacta	Escallonia	Occasional
Escallonia rubra	redclaws	Occasional
Escallonia spp.		Occasional
Eucalyptus	gum	Primary
Eucalyptus ×mortoniana		Primary
Eucalyptus camaldulensis	river redgum	Primary
Eucalyptus cladocalyx	sugargum	Primary
Eucalyptus globulus	Tasmanian bluegum	Primary
Eucalyptus polyanthemos	redbox	Primary
Eucalyptus pulverulenta	silverleaf mountain gum	Primary
Eucalyptus sideroxylon	red ironbark	Primary
Eucalyptus spp.	eucalyptus, gum trees	Primary
Eucalyptus tereticornis	forest redgum	Primary
Eucalyptus torquata	coral gum	Primary
Eucalyptus viminalis	manna gum	Primary
Eugenia	stopper	Occasional
Eugenia apiculata	shortleaf stopper	Occasional
Eugenia spp.	cherry of the Rio Grande, Lilly Pilly, Surinam cherry	Occasional
Euonymus	Spindletree	Occasional
Euonymus occidentale	western burning bush	Occasional
Euonymus occidentalis		Occasional
Euonymus spp.	euonymus, spindle tree	Occasional
Euphorbia	spurge	
Euphorbia characias	Albanian spurge	
Euphorbia crenulata	Chinese caps	
Euphorbia cyathophora	fire on the mountain	
Euphorbia cyparissias	cypress spurge	

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Euphorbia davidii	David's spurge	
Euphorbia dendroides	tree spurge	
Euphorbia dentata	toothed spurge	
Euphorbia eriantha	beetle spurge	
Euphorbia esula	leafy spurge	
Euphorbia exigua	dwarf spurge	
Euphorbia exstipulata	squareseed spurge	
Euphorbia helioscopia	madwoman's milk	
Euphorbia heterophylla	Mexican fireplant	
Euphorbia lathyris	moleplant	
Euphorbia marginata	snow on the mountain	
Euphorbia misera	cliff spurge	
Euphorbia myrsinites	myrtle spurge	
Euphorbia oblongata	eggleaf spurge	
Euphorbia palmeri	woodland spurge	
Euphorbia peplus	petty spurge	
Euphorbia rigida	upright myrtle spurge	
Euphorbia schizoloba	Mojave spurge	
Euphorbia serrata	serrate spurge	
Euphorbia spathulata	warty spurge	
Euphorbia spp.	euphorbia, spurges	
Euphorbia terracina	Geraldton carnation weed	
Euphorbia tirucalli	Indiantree spurge	
Fagus spp.	beech	Occasional
Feijoa sellowiana	Pineapple Guava	Primary
Feijoa spp.	feijoa, pineapple guava	Primary
Ficus	fig	Occasional
Ficus carica	edible fig	Occasional
Ficus palmata	Punjab fig	Occasional
Ficus rubiginosa	Port Jackson fig	Occasional
Ficus spp.	Climbing Fig	Occasional
Forsythia spp.	forsythias	Occasional
Fortunella	kumquat	Common
Fortunella japonica	round kumquat	Common
Fortunella spp.	kumquats	Common
Fragaria	strawberry	Very Common
Fragaria ×ananassa		Very Common
Fragaria ×bringhurstii		Very Common
Fragaria chiloensis	beach strawberry	Very Common
Fragaria chiloensis	Pacific beach strawberry	Very Common
Fragaria spp.	Strawberry	Very Common
Fragaria vesca	California strawberry	Very Common
Fragaria vesca	woodland strawberry	Very Common
Fragaria virginiana	Virginia strawberry	Very Common
Fraxinus	ash	
Fraxinus anomala	singleleaf ash	

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Fraxinus dipetala	California ash	
Fraxinus latifolia	Oregon ash	
Fraxinus spp.	ash	
Fraxinus uhdei	shamel ash	
Fraxinus velutina	velvet ash	
Fuchsia	fuchsia	Occasional
Fuchsia boliviana	Bolivian fuchsia	Occasional
Fuchsia hybrida	hybrid fuchsia	Occasional
Fuchsia magellanica	hardy fuchsia	Occasional
Fuchsia paniculata	shrubby fuchsia	Occasional
Fuchsia spp.	Fuchsia	Occasional
Fumaria	fumitory	
Fumaria capreolata	white ramping fumitory	
Fumaria officinalis	drug fumitory	
Fumaria parviflora	fineleaf fumitory	
Fumaria spp.	fumitory	
Garrya	silktassel	Occasional
Garrya buxifolia	dwarf silktassel	Occasional
Garrya congdonii	chaparral silktassel	Occasional
Garrya elliptica	wavyleaf silktassel	Occasional
Garrya flavescens	ashy silktassel	Occasional
Garrya fremontii	bearbrush	Occasional
Garrya spp.	silk-tassel	Occasional
Garrya veatchii	canyon silktassel	Occasional
Gelsemium spp.	Carolina jessamine	Occasional
Genista	broom	Very Common
Genista aetnensis	Mt. Etna broom	Very Common
Genista canariensis	Canary broom	Very Common
Genista linifolia	Mediterranean broom	Very Common
Genista maderensis	Madeira Dyer's greenweed	Very Common
Genista monspessulana	French broom	Very Common
Genista spp.	brooms	Very Common
Genista stenopetala	leafy broom	Very Common
Geranium	geranium	Occasional
Geranium bicknellii	Bicknell's cranesbill	Occasional
Geranium californicum	California cranesbill	Occasional
Geranium carolinianum	Carolina geranium	Occasional
Geranium columbinum	longstalk cranesbill	Occasional
Geranium dissectum	cutleaf geranium	Occasional
Geranium homeanum	Australasian geranium	Occasional
Geranium lucidum	shining geranium	Occasional
Geranium molle	dovefoot geranium	Occasional
Geranium nervosum		Occasional
Geranium oreganum	Oregon geranium	Occasional
Geranium palmatum	Canary Island geranium	Occasional
Geranium potentilloides	cinquefoil geranium	Occasional
Geranium pusillum	small geranium	Occasional

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Geranium pyrenaicum	hedgerow geranium	Occasional
Geranium retrorsum	New Zealand geranium	Occasional
Geranium richardsonii	Richardson's geranium	Occasional
Geranium robertianum		Occasional
Geranium robertianum	Robert geranium	Occasional
Geranium rotundifolium	roundleaf geranium	Occasional
Geranium sibiricum	Siberian geranium	Occasional
Geranium solanderi	Solander's geranium	Occasional
Geranium spp.	Cranesbill	Occasional
Geranium texanum	Texas geranium	Occasional
Geranium viscosissimum	sticky purple geranium	Occasional
Gerbera spp.	Transvaal daisy	Common
Gomphocarpus spp.	cotton bush, hairy balls, wild cotton	Occasional
Grevillea spp.	hummingbird bush, grevilleas, silky-oak	Occasional
Gypsophila	baby's-breath	
Gypsophila elegans	showy baby's-breath	
Gypsophila paniculata	baby's breath	
Gypsophila scorzonerifolia	garden baby's-breath	
Gypsophila spp.	baby’s-breath	
Hakea spp.	pincushion tree	Occasional
Haloragis	seaberry	Occasional
Haloragis erecta	erect seaberry	Occasional
Haloragis spp.	erect seaberry, seaberry	Occasional
Hardenbergia spp.	coral pea, lilac vine Hebe spp. (hebe)	Very Common
Hebe	hebe	Occasional
Hebe ×franciscana		Occasional
Hebe speciosa	New Zealand hebe	Occasional
Hedera	ivy	Occasional
Hedera canariensis	Canary ivy	Occasional
Hedera helix	English ivy	Occasional
Hedera spp.	ivy	Occasional
Helianthus	sunflower	Common
Helianthus annuus	common sunflower	Common
Helianthus bolanderi	serpentine sunflower	Common
Helianthus californicus	California sunflower	Common
Helianthus ciliaris	Texas blueweed	Common
Helianthus cusickii	Cusick's sunflower	Common
Helianthus gracilentus	slender sunflower	Common
Helianthus maximiliani	Maximilian sunflower	Common
Helianthus niveus	Algodones sunflower	Common
Helianthus niveus	showy sunflower	Common
Helianthus nuttallii	Nuttall's sunflower	Common
Helianthus nuttallii	Parish's sunflower	Common
Helianthus petiolaris	prairie sunflower	Common
Helianthus spp.	Jerusalem artichoke, sunflower	Common
Helianthus tuberosus	Jerusalem artichoke	Common

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Helichrysum	strawflower	Common
Helichrysum petiolare	licorice-plant	Common
Helichrysum spp.	curry plant, licorice plant, straw flower	Common
Heteromeles	toyon	
Heteromeles arbutifolia		
Heteromeles salicifolia		
Hibiscus	rosemallow	
Hibiscus denudatus	paleface	
Hibiscus lasiocarpos	rosemallow	
Hibiscus spp.	Hibiscus	
Hibiscus syriacus	Hibiscus	
Hibiscus trionum	flower of an hour	
Hoheria		Occasional
Hoheria populnea	lacebark	Occasional
Hoheria spp.	Lacebark	Occasional
Holcus	velvetgrass	Occasional
Holcus lanatus	common velvetgrass	Occasional
Holcus mollis	creeping velvetgrass	Occasional
Holcus spp.	velvet grass	Occasional
Humulus	hop	Primary
Humulus lupulus	common hop	Primary
Humulus spp.	hops	Primary
Hydrangea quercifolia	Oak Leaf Hydrangea	
Hypericum	St. Johnswort	Common
Hypericum anagalloides	tinker's penny	Common
Hypericum androsaemum	sweet-amber	Common
Hypericum calycinum	Aaron's beard	Common
Hypericum canariense	Canary Island St. Johnswort	Common
Hypericum concinnum	goldwire	Common
Hypericum hookerianum	Hooker's St. Johnswort	Common
Hypericum mutilum	dwarf St. Johnswort	Common
Hypericum perforatum	common St. Johnswort	Common
Hypericum scouleri	Scouler's St. Johnswort	Common
Hypericum spp.	Aaron’s beard, sweet-amber, St. John’s wort	Common
Ilex	holly	Occasional
Ilex ×attenuata	topal holly	Occasional
Ilex aquifolium	English holly	Occasional
Ilex spp.	holly	Occasional
Iris	Iris	Occasional
Iris bracteata	Siskiyou iris	Occasional
Iris chrysophylla	yellowleaf iris	Occasional
Iris douglasiana	Douglas iris	Occasional
Iris fernaldii	Fernald's iris	Occasional
Iris foetidissima	stinking iris	Occasional
Iris germanica	German iris	Occasional
Iris hartwegii	rainbow iris	Occasional

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Iris innominata	Del Norte County iris	Occasional
Iris longipetala		Occasional
Iris macrosiphon	bowltube iris	Occasional
Iris missouriensis	Rocky Mountain iris	Occasional
Iris munzii	Munz's iris	Occasional
Iris orientalis	yellowband iris	Occasional
Iris pseudacorus	paleyellow iris	Occasional
Iris purdyi	Purdy's iris	Occasional
Iris sibirica	Siberian iris	Occasional
Iris spp.	iris	Occasional
Iris spuria	seashore iris	Occasional
Iris tenax	Klamath iris	Occasional
Iris tenax	toughleaf iris	Occasional
Iris tenuissima	longtube iris	Occasional
Iris thompsonii	Thompson's iris	Occasional
Jasminum spp.	jasmine	Occasional
Juglans	walnut	Occasional
Juglans californica	Southern California walnut	Occasional
Juglans hindsii	Northern California walnut	Occasional
Juglans regia	English walnut	Occasional
Juglans spp.	California black walnut, butternut, English walnut	Occasional
Juncus	rush	
Juncus acuminatus	tapertip rush	
Juncus acutus	Leopold's rush	
Juncus acutus	spiny rush	
Juncus ambiguus	seasice rush	
Juncus arcticus	Baltic rush	
Juncus articulatus	jointleaf rush	
Juncus balticus		
Juncus bolanderi	Bolander's rush	
Juncus brachyphyllus	tuftedstem rush	
Juncus breweri	Brewer's rush	
Juncus bryoides	moss rush	
Juncus bufonius	toad rush	
Juncus capillaris	hairystem dwarf rush	
Juncus capitatus	leafybract dwarf rush	
Juncus chlorocephalus	greenhead rush	
Juncus confusus	Colorado rush	
Juncus cooperi	Cooper's rush	
Juncus covillei	Coville's rush	
Juncus cyperoides	Forbestown rush	
Juncus diffusissimus	slimpod rush	
Juncus drummondii	Drummond's rush	
Juncus drummondii	threeflower rush	
Juncus dubius	dubius rush	
Juncus dudleyi	Dudley's rush	

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Juncus duranii	Duran's rush	
Juncus effusus	common rush	
Juncus effusus	lamp rush	
Juncus effusus	Pacific rush	
Juncus ensifolius	swordleaf rush	
Juncus falcatus	falcate rush	
Juncus hemiendytus	Herman's dwarf rush	
Juncus howellii	Howell's rush	
Juncus kelloggii	Kellogg's dwarf rush	
Juncus leiospermus	Ahart's dwarf rush	
Juncus leiospermus	Red Bluff dwarf rush	
Juncus lesueurii	salt rush	
Juncus longistylis	longstyle rush	
Juncus luciensis	Santa Lucia dwarf rush	
Juncus macrandrus	longanther rush	
Juncus macrophyllus	longleaf rush	
Juncus marginatus	grassleaf rush	
Juncus mertensianus	Mertens' rush	
Juncus mexicanus	Mexican rush	
Juncus nevadensis	Sierra rush	
Juncus nodatus	stout rush	
Juncus nodosus	knotted rush	
Juncus occidentalis	western rush	
Juncus orthophyllus	straightleaf rush	
Juncus oxymeris	pointed rush	
Juncus parryi	Parry's rush	
Juncus patens	spreading rush	
Juncus phaeocephalus	brownhead rush	
Juncus regelii	Regel's rush	
Juncus rugulosus	wrinkled rush	
Juncus saximontanus	Rocky Mountain rush	
Juncus spp.	rush	
Juncus supiniformis	hairyleaf rush	
Juncus tenuis	poverty rush	
Juncus textilis	basket rush	
Juncus tiehmii	Nevada rush	
Juncus torreyi	Torrey's rush	
Juncus triformis	Yosemite dwarf rush	
Juncus uncialis	twelfth rush	
Juncus xiphioides	irisleaf rush	
Kerria spp.	Japanese kerria	Very Common
Kunzea spp.	Burgan	
Laburnum	golden chain tree	Very Common
Laburnum anagyroides	golden chain tree	Very Common
Laburnum spp.	bean treegolden-chain	Very Common
Lagerstroemia indica	Crape Myrtle	

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Lagunaria spp.	cow itch tree, Hercules' club, white field gourd	
Lantana	lantana	Occasional
Lantana camara	lantana	Occasional
Lantana montevidensis	trailing shrubverbena	Occasional
Lantana spp.	lantana	Occasional
Lantana urticoides	West Indian shrubverbena	Occasional
Lathyrus	pea	Very Common
Lathyrus angulatus	angled pea	Very Common
Lathyrus aphaca	yellow pea	Very Common
Lathyrus biflorus	twoflower pea	Very Common
Lathyrus bijugatus	drypark pea	Very Common
Lathyrus cicera	red pea	Very Common
Lathyrus delnorticus	Del Norte pea	Very Common
Lathyrus glandulosus	redwood pea	Very Common
Lathyrus hirsutus	Caley pea	Very Common
Lathyrus hitchcockianus	Bullfrog Mountain pea	Very Common
Lathyrus japonicus	beach pea	Very Common
Lathyrus jepsonii	California pea	Very Common
Lathyrus jepsonii	Delta tule pea	Very Common
Lathyrus lanszwertii	Brown's pea	Very Common
Lathyrus lanszwertii	Lanszwert's pea	Very Common
Lathyrus lanszwertii	Nevada pea	Very Common
Lathyrus lanszwertii	Tracy's pea	Very Common
Lathyrus latifolius	perennial pea	Very Common
Lathyrus littoralis	silky beach pea	Very Common
Lathyrus nevadensis	Sierra pea	Very Common
Lathyrus odoratus	sweetpea	Very Common
Lathyrus palustris	marsh pea	Very Common
Lathyrus polyphyllus	leafy pea	Very Common
Lathyrus rigidus	stiff pea	Very Common
Lathyrus sativus	white pea	Very Common
Lathyrus sphaericus	grass pea	Very Common
Lathyrus splendens	pride of California	Very Common
Lathyrus spp.	sweet pea	Very Common
Lathyrus sulphureus	snub pea	Very Common
Lathyrus tingitanus	Tangier pea	Very Common
Lathyrus torreyi	Torrey's pea	Very Common
Lathyrus vestitus	Alefeld's pea	Very Common
Lathyrus vestitus	Bolander's pea	Very Common
Lathyrus vestitus	Pacific pea	Very Common
Laurus	laurel	Occasional
Laurus nobilis	Sweet Bay	Occasional
Laurus nobilis	Sweet Bay	Occasional
Laurus spp.	Grecian laurel, sweet bay	Occasional
Lavandula	Lavender	
Lavandula spp.		

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Lavandula stoechas	French lavender	
Leptospermum	teatree	Occasional
Leptospermum laevigatum	Australian teatree	Occasional
Leptospermum spp.	tea trees	Occasional
Leucadendron spp.		
Ligustrum	privet	Primary
Ligustrum lucidum		Primary
Ligustrum ovalifolium	California privet	Primary
Ligustrum spp.	privet	Primary
Lilium	lily	Occasional
Lilium bolanderi	Bolander's lily	Occasional
Lilium columbianum	Columbia lily	Occasional
Lilium humboldtii	Humboldt lily	Occasional
Lilium humboldtii	Humboldt's lily	Occasional
Lilium kelleyanum	Kelley's lily	Occasional
Lilium kelloggii	Kellogg's lily	Occasional
Lilium maritimum	coast lily	Occasional
Lilium occidentale	western lily	Occasional
Lilium pardalinum	leopard lily	Occasional
Lilium pardalinum	Pitkin Marsh lily	Occasional
Lilium pardalinum	Shasta lily	Occasional
Lilium pardalinum	Vollmer's lily	Occasional
Lilium pardalinum	Wiggins' lily	Occasional
Lilium parryi	lemon lily	Occasional
Lilium parvum	Sierra tiger lily	Occasional
Lilium rubescens	redwood lily	Occasional
Lilium spp.	lilies	Occasional
Lilium washingtonianum	Cascade lily	Occasional
Lilium washingtonianum	Washington lily	Occasional
Linum	flax	Occasional
Linum bienne	pale flax	Occasional
Linum grandiflorum	flowering flax	Occasional
Linum lewisii	Lewis flax	Occasional
Linum lewisii	prairie flax	Occasional
Linum puberulum	plains flax	Occasional
Linum spp.	flax	Occasional
Linum trigynum	French flax	Occasional
Linum usitatissimum	common flax	Occasional
Litchi spp.		Primary
Lomandra spp.	mat-rush nyalla, tanika	Common
Lonicera	honeysuckle	Occasional
Lonicera caerulea	bluefly honeysuckle	Occasional
Lonicera caerulea	sweetberry honeysuckle	Occasional
Lonicera ciliosa	orange honeysuckle	Occasional
Lonicera conjugialis	purpleflower honeysuckle	Occasional
Lonicera etrusca	Etruscan honeysuckle	Occasional

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Lonicera hispidula	pink honeysuckle	Occasional
Lonicera interrupta	chaparral honeysuckle	Occasional
Lonicera involucrata	black twinberry	Occasional
Lonicera involucrata	fly honeysuckle	Occasional
Lonicera japonica	honeysuckle	Occasional
Lonicera spp.	honeysuckles	Occasional
Lonicera subspicata	Johnston's honeysuckle	Occasional
Lonicera subspicata	Santa Barbara honeysuckle	Occasional
Lonicera subspicata	southern honeysuckle	Occasional
Lonicera tatarica	Tatarian honeysuckle	Occasional
Loropetalum chinense	Loropetalum	
Lotus	trefoil	Very Common
Lotus aboriginus	rosy bird's-foot trefoil	Very Common
Lotus angustissimus	slender bird's-foot trefoil	Very Common
Lotus argophyllus	Fremont's birsfoot trefoil	Very Common
Lotus argophyllus	Santa Cruz Island silverhosackia	Very Common
Lotus argophyllus	silver bird's-foot trefoil	Very Common
Lotus argyraeus	canyon bird's-foot trefoil	Very Common
Lotus benthamii	Bentham's broom	Very Common
Lotus corniculatus	bird's-foot trefoil	Very Common
Lotus crassifolius	big deervetch	Very Common
Lotus dendroideus	island broom	Very Common
Lotus dendroideus	Trask's island broom	Very Common
Lotus dendroideus	Veatch's island broom	Very Common
Lotus denticulatus	riverbar bird's-foot trefoil	Very Common
Lotus formosissimus	seaside bird's-foot trefoil	Very Common
Lotus glaber	narrow-leaf bird's-foot trefoil	Very Common
Lotus grandiflorus	chaparral bird's-foot trefoil	Very Common
Lotus hamatus	San Diego bird's-foot trefoil	Very Common
Lotus haydonii	rock bird's-foot trefoil	Very Common
Lotus heermannii	Heermann's bird's-foot trefoil	Very Common
Lotus humistratus	foothill deervetch	Very Common
Lotus incanus	woolly bird's-foot trefoil	Very Common
Lotus junceus	Biolett's rush broom	Very Common
Lotus junceus	rush broom	Very Common
Lotus micranthus	desert deervetch	Very Common
Lotus nevadensis	Davidson's bird's-foot trefoil	Very Common
Lotus nevadensis	Douglas' bird's-foot trefoil	Very Common
Lotus nevadensis	Nevada bird's-foot trefoil	Very Common
Lotus nuttallianus	wire bird's-foot trefoil	Very Common
Lotus oblongifolius	streambank bird's-foot trefoil	Very Common
Lotus pedunculatus	big trefoil	Very Common
Lotus pinnatus	meadow bird's-foot trefoil	Very Common
Lotus procumbens	Jepson's deerweed	Very Common
Lotus procumbens	silky deerweed	Very Common
Lotus rigidus	shrubby deervetch	Very Common

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Lotus rubriflorus	redflower bird's-foot trefoil	Very Common
Lotus salsuginosus	coastal bird's-foot trefoil	Very Common
Lotus scoparius	common deerweed	Very Common
Lotus scoparius	western bird's-foot trefoil	Very Common
Lotus spp.	bird’s-foot trefoil, parrot’s-beak, winged pea	Very Common
Lotus stipularis	balsam bird's-foot trefoil	Very Common
Lotus stipularis	Ottley's bird's-foot trefoil	Very Common
Lotus strigosus	strigose bird's-foot trefoil	Very Common
Lotus unifoliolatus	American bird's-foot trefoil	Very Common
Lotus wrangelianus	Chilean bird's-foot trefoil	Very Common
Lotus yollabolliensis	Yolla Bolly bird's-foot trefoil	Very Common
Luma apiculata		
Lupinus	lupine	Very Common
Lupinus ×alpestris	Great Basin lupine	Very Common
Lupinus ×cymba-egressus		Very Common
Lupinus ×inyoensis		Very Common
Lupinus abramsii	Abrams' lupine	Very Common
Lupinus adsurgens	Drew's silky lupine	Very Common
Lupinus affinis	fleshy lupine	Very Common
Lupinus agardhianus	Agardh lupine	Very Common
Lupinus albicaulis	Shasta lupine	Very Common
Lupinus albicaulis	sicklekeel lupine	Very Common
Lupinus albifrons	Douglas' silver lupine	Very Common
Lupinus albifrons	silver lupine	Very Common
Lupinus andersonii	Anderson's lupine	Very Common
Lupinus angustiflorus	narrowflower lupine	Very Common
Lupinus antoninus	Anthony Peak lupine	Very Common
Lupinus apertus	summit lupine	Very Common
Lupinus arboreus	yellow bush lupine	Very Common
Lupinus arbustus	longspur lupine	Very Common
Lupinus argenteus	silvery lupine	Very Common
Lupinus aridus	desert lupine	Very Common
Lupinus arizonicus	Arizona lupine	Very Common
Lupinus benthamii	spider lupine	Very Common
Lupinus bicolor	miniature lupine	Very Common
Lupinus brevicaulis	shortstem lupine	Very Common
Lupinus brevior	short lupine	Very Common
Lupinus breweri	Brewer's lupine	Very Common
Lupinus breweri	matted lupine	Very Common
Lupinus caespitosus	stemless dwarf lupine	Very Common
Lupinus caespitosus	Utah lupine	Very Common
Lupinus caudatus	Kellogg's spurred lupine	Very Common
Lupinus caudatus	tailcup lupine	Very Common
Lupinus cervinus	Santa Lucia lupine	Very Common
Lupinus chamissonis	chamisso bush lupine	Very Common
Lupinus citrinus	orangeflower lupine	Very Common

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Lupinus concinnus	bajada lupine	Very Common
Lupinus concinnus	Orcutt's lupine	Very Common
Lupinus confertus	crowded lupine	Very Common
Lupinus congdonii	Congdon's lupine	Very Common
Lupinus constancei	lassicus lupine	Very Common
Lupinus covillei	shaggy lupine	Very Common
Lupinus croceus	Mt. Eddy lupine	Very Common
Lupinus culbertsonii	Hoskett Meadows lupine	Very Common
Lupinus dalesiae	Quincy lupine	Very Common
Lupinus densiflorus	whitewhorl lupine	Very Common
Lupinus duranii	Mono Lake lupine	Very Common
Lupinus elatus	tall silky lupine	Very Common
Lupinus elmeri	Elmer's lupine	Very Common
Lupinus excubitus	grape soda lupine	Very Common
Lupinus excubitus	Hall's bush lupine	Very Common
Lupinus excubitus	interior bush lupine	Very Common
Lupinus excubitus	mountain bush lupine	Very Common
Lupinus excubitus	Mountain Springs bush lupine	Very Common
Lupinus eximius	San Mateo tree lupine	Very Common
Lupinus flavoculatus	yelloweyes	Very Common
Lupinus formosus	summer lupine	Very Common
Lupinus fulcratus	greenstipule lupine	Very Common
Lupinus gracilentus	green slender lupine	Very Common
Lupinus grayi	Sierra lupine	Very Common
Lupinus guadalupensis	Guadalupe Island lupine	Very Common
Lupinus hirsutissimus	stinging annual lupine	Very Common
Lupinus holmgrenianus	Holmgren's lupine	Very Common
Lupinus horizontalis	sunset lupine	Very Common
Lupinus hyacinthinus	San Jacinto lupine	Very Common
Lupinus lapidicola	Heller's dwarf lupine	Very Common
Lupinus latifolius	broadleaf lupine	Very Common
Lupinus lepidus		Very Common
Lupinus leucophyllus	velvet lupine	Very Common
Lupinus littoralis	seashore lupine	Very Common
Lupinus longifolius	longleaf bush lupine	Very Common
Lupinus ludovicianus	San Luis lupine	Very Common
Lupinus luteolus	pale yellow lupine	Very Common
Lupinus lyallii	dwarf mountain lupine	Very Common
Lupinus magnificus	Panamint Mountain lupine	Very Common
Lupinus meionanthus	Lake Tahoe lupine	Very Common
Lupinus microcarpus		Very Common
Lupinus nanus	Menker's lupine	Very Common
Lupinus nanus	sky lupine	Very Common
Lupinus nevadensis	Nevada lupine	Very Common
Lupinus nipomensis	Nipomo Mesa lupine	Very Common
Lupinus obtusilobus	bluntlobe lupine	Very Common

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Lupinus odoratus	Mojave royal lupine	Very Common
Lupinus onustus	Plumas lupine	Very Common
Lupinus pachylobus	Mt. Diablo lupine	Very Common
Lupinus padre-crowleyi	Dedecker lupine	Very Common
Lupinus pallidus	pale desert lupine	Very Common
Lupinus palmeri	bluebonnet lupine	Very Common
Lupinus peirsonii	long lupine	Very Common
Lupinus polycarpus	smallflower lupine	Very Common
Lupinus polyphyllus	bigleaf lupine	Very Common
Lupinus pratensis	Inyo Meadow lupine	Very Common
Lupinus prunophilus	hairy bigleaf lupine	Very Common
Lupinus punto-reyesensis	Point reyes lupine	Very Common
Lupinus purpurascens	Yuba lupine	Very Common
Lupinus pusillus	Intermountain lupine	Very Common
Lupinus pusillus	rusty lupine	Very Common
Lupinus rivularis	riverbank lupine	Very Common
Lupinus ruber	red lupine	Very Common
Lupinus saxosus	rock lupine	Very Common
Lupinus sellulus	Donner Lake lupine	Very Common
Lupinus sericatus	Cobb Mountain lupine	Very Common
Lupinus sericeus		Very Common
Lupinus shockleyi	purple desert lupine	Very Common
Lupinus sparsiflorus	Mojave lupine	Very Common
Lupinus sparsiflorus	Pond's Mojave lupine	Very Common
Lupinus spectabilis	shaggyhair lupine	Very Common
Lupinus spp.	lupines	Very Common
Lupinus stiversii	harlequin annual lupine	Very Common
Lupinus sublanatus	Mono lupine	Very Common
Lupinus subvexus	valley lupine	Very Common
Lupinus succulentus	hollowleaf annual lupine	Very Common
Lupinus tidestromii	Tidestrom's lupine	Very Common
Lupinus tracyi	Tracy's lupine	Very Common
Lupinus truncatus	collared annual lupine	Very Common
Lupinus uncialis	inchhigh lupine	Very Common
Lupinus vallicola	open lupine	Very Common
Lupinus variicolor		Very Common
Lupinus versicolor	manycolored lupine	Very Common
Lycopersicom spp.		
Macadamia spp.	macadamia	Occasional
Magnolia spp.	Magnolia	Occasional
Malus	apple	Very Common
Malus fusca	Oregon crabapple	Very Common
Malus pumila	paradise apple	Very Common
Malus spp.	apple	Very Common
Malus spp.	Flowering CrabApple	Very Common
Malva	mallow	Occasional

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Malva assurgentiflora		Occasional
Malva moschata	musk mallow	Occasional
Malva neglecta	common mallow	Occasional
Malva nicaeensis	bull mallow	Occasional
Malva parviflora	cheeseweed mallow	Occasional
Malva pusilla	low mallow	Occasional
Malva spp.	mallow	Occasional
Malva sylvestris	high mallow	Occasional
Malva verticillata	cluster mallow	Occasional
Mangifera spp.	Mango	Occasional
Medicago	alfalfa	Very Common
Medicago arabica	spotted medick	Very Common
Medicago lupulina	black medick	Very Common
Medicago minima	burr medick	Very Common
Medicago orbicularis	blackdisk medick	Very Common
Medicago polymorpha	burclover	Very Common
Medicago praecox	Mediterranean medick	Very Common
Medicago sativa	alfalfa	Very Common
Medicago sativa	yellow alfalfa	Very Common
Medicago spp.	alfalfa, bur clover, yellow trefoil	Very Common
Melaleuca quinquenervia	Paperback Melaleuca	Occasional
Melaleuca spp.	honey myrtle, bottlebrush	Occasional
Melilotus	Sweetclover	Very Common
Melilotus indicus	annual yellow sweetclover	Very Common
Melilotus officinalis	yellow sweetclover	Very Common
Melilotus spp.		Very Common
Mentha	Mint	Occasional
Mentha ×piperita	Peppermint	Occasional
Mentha ×villosa		Occasional
Mentha aquatica	water mint	Occasional
Mentha arvensis	wild mint	Occasional
Mentha canadensis		Occasional
Mentha pulegium	pennyroyal	Occasional
Mentha spicata	spearmint	Occasional
Mentha spp.	mint	Occasional
Mentha suaveolens	apple mint	Occasional
Mesembryanthemum	iceplant	Occasional
Mesembryanthemum crystallinum	common iceplant	Occasional
Mesembryanthemum nodiflorum	slenderleaf iceplant	Occasional
Mesembryanthemum spp.	ice plant	Occasional
Metrosideros spp.	bottlebrush, iron tree, New Zealand Christmas tree	Occasional
Michelia spp.	michelia	Occasional
Monotoca spp.	broomheaths	Occasional
Muehlenbeckia	maidenhair vine	
Muehlenbeckia complexa	maidenhair vine	
Muehlenbeckia hastatula	wirevine	

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Muehlenbeckia spp.	maidenhair vine, wire plant	
Myoporum	myoporum	
Myoporum laetum	ngaio tree	
Myoporum spp.	myoporum, Ngaio-tree	
Myosotis	forget-me-not	Occasional
Myosotis azorica	Azores forget-me-not	Occasional
Myosotis discolor	changing forget-me-not	Occasional
Myosotis latifolia	broadleaf forget-me-not	Occasional
Myosotis laxa	bay forget-me-not	Occasional
Myosotis scorpioides	true forget-me-not	Occasional
Myosotis spp.	forget-me-not, scorpion grass	Occasional
Myosotis stricta	strict forget-me-not	Occasional
Myosotis sylvatica	woodland forget-me-not	Occasional
Myosotis verna	spring forget-me-not	Occasional
Myrica	sweetgale	
Myrica californica	California Myrtle	
Myrica hartwegii	Sierra bayberry	
Myrtus communis	Myrtle	
Nemesia spp.	Nemesia	Occasional
Olea	olive	
Olea europaea	olive	
Olea spp.	olive	
Opuntia	pricklypear	Occasional
Opuntia ×curvospina	searchlight pricklypear	Occasional
Opuntia ×demissa		Occasional
Opuntia ×occidentalis		Occasional
Opuntia ×vaseyi	Vasey's coastal pricklypear	Occasional
Opuntia basilaris	beavertail pricklypear	Occasional
Opuntia basilaris	Trelease's beavertail pricklypear	Occasional
Opuntia chlorotica	dollarjoint pricklypear	Occasional
Opuntia engelmannii	cactus apple	Occasional
Opuntia ficus-indica	Barbary fig	Occasional
Opuntia fragilis	brittle pricklypear	Occasional
Opuntia littoralis	coastal pricklypear	Occasional
Opuntia oricola	chaparral pricklypear	Occasional
Opuntia phaeacantha	tulip pricklypear	Occasional
Opuntia polyacantha	grizzlybear pricklypear	Occasional
Opuntia polyacantha	hairspine pricklypear	Occasional
Opuntia polyacantha	plains pricklypear	Occasional
Opuntia spp.	beaver-tail, cholla, pencil cactus, prickly pear,rabbit-ears, tuna	Occasional
Opuntia tomentosa	woollyjoint pricklypear	Occasional
Oxalis	woodsorrel	Occasional
Oxalis albicans	California woodsorrel	Occasional
Oxalis albicans	radishroot woodsorrel	Occasional
Oxalis bowiei	red-flower woodsorrel	Occasional
Oxalis corniculata	creeping woodsorrel	Occasional

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Oxalis hirta	tropical woodsorrel	Occasional
Oxalis incarnata	crimson woodsorrel	Occasional
Oxalis latifolia	broadleaf woodsorrel	Occasional
Oxalis oregana	redwood-sorrel	Occasional
Oxalis pes-caprae	Bermuda buttercup	Occasional
Oxalis purpurea	purple woodsorrel	Occasional
Oxalis radicosa	dwarf woodsorrel	Occasional
Oxalis rubra	windowbox woodsorrel	Occasional
Oxalis spp.	lady's sorrel, redwood sorrel, wood sorrel	Occasional
Oxalis suksdorfii	Suksdorf woodsorrel	Occasional
Oxalis trilliifolia	threeleaf woodsorrel	Occasional
Paeonia	peony	Occasional
Paeonia brownii	Brown's peony	Occasional
Paeonia californica	California peony	Occasional
Paeonia spp.		Occasional
Pandorea jasminoides	Jasmine	
Parahebe spp.		Occasional
Parkinsonia	paloverde	
Parkinsonia aculeata	Jerusalem thorn	
Parkinsonia florida	blue paloverde	
Parkinsonia microphylla	yellow paloverde	
Parkinsonia spp.	Jerusalem thorn, Mexican palo verde	
Parthenocissus	Creeper	Very Common
Parthenocissus spp.	woodbine, Virginia creeper	Very Common
Parthenocissus vitacea	woodbine	Very Common
Passiflora	passionflower	Common
Passiflora caerulea	bluecrown passionflower	Common
Passiflora manicata	red passionflower	Common
Passiflora spp.	Passion Vine	Common
Passiflora tripartita	banana passionflower	Common
Passiflora tripartita	banana poka	Common
Pastinaca	parsnip	Occasional
Pastinaca sativa	wild parsnip	Occasional
Pastinaca spp.	parsnip	Occasional
Pelargonium	geranium	Occasional
Pelargonium ×domesticum	regal pelargonium	Occasional
Pelargonium ×hortorum	zonal geranium	Occasional
Pelargonium capitatum	rose scented geranium	Occasional
Pelargonium grossularioides	gooseberry geranium	Occasional
Pelargonium inodorum	scentless geranium	Occasional
Pelargonium inquinans	scarlet geranium	Occasional
Pelargonium panduriforme	oakleaf garden geranium	Occasional
Pelargonium peltatum	ivyleaf geranium	Occasional
Pelargonium quercifolium	oakleaf geranium	Occasional
Pelargonium spp.	geranium	Occasional
Pelargonium vitifolium	grapeleaf geranium	Occasional

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Pelargonium zonale	horseshoe geranium	Occasional
Penstemon	beardtongue	Occasional
Penstemon ×dubius		Occasional
Penstemon ×parishii		Occasional
Penstemon ×peirsonii		Occasional
Penstemon albomarginatus	whitemargin beardtongue	Occasional
Penstemon anguineus	Siskiyou beardtongue	Occasional
Penstemon azureus	azure penstemon	Occasional
Penstemon barbatus	Penstemen	Occasional
Penstemon barnebyi	White River Valley beardtongue	Occasional
Penstemon bicolor	pinto beardtongue	Occasional
Penstemon bryantiae	Bryant's beardtongue	Occasional
Penstemon caesius	San Bernardino beardtongue	Occasional
Penstemon calcareus	limestone beardtongue	Occasional
Penstemon californicus	California penstemon	Occasional
Penstemon centranthifolius	scarlet bugler	Occasional
Penstemon cinicola	ash penstemon	Occasional
Penstemon clevelandii	Cleveland's beardtongue	Occasional
Penstemon clevelandii	San Jacinto beardtongue	Occasional
Penstemon davidsonii	Davidson's penstemon	Occasional
Penstemon deustus	scabland penstemon	Occasional
Penstemon eatonii	firecracker penstemon	Occasional
Penstemon filiformis	threadleaf beardtongue	Occasional
Penstemon floridus	Austin's beardtongue	Occasional
Penstemon floridus	Panamint beardtongue	Occasional
Penstemon fruticiformis	Death Valley beardtongue	Occasional
Penstemon gracilentus	slender penstemon	Occasional
Penstemon grinnellii	Grinnell's beardtongue	Occasional
Penstemon heterodoxus	Shasta beardtongue	Occasional
Penstemon heterodoxus	Sierra beardtongue	Occasional
Penstemon heterophyllus	bunchleaf penstemon	Occasional
Penstemon heterophyllus	foothill beardtongue	Occasional
Penstemon heterophyllus	Purdy's penstemon	Occasional
Penstemon humilis	low beardtongue	Occasional
Penstemon incertus	Mojave beardtongue	Occasional
Penstemon janishiae	Antelope Valley beardtongue	Occasional
Penstemon labrosus	San Gabriel beardtongue	Occasional
Penstemon laetus	mountain blue penstemon	Occasional
Penstemon monoensis	Mono penstemon	Occasional
Penstemon neotericus	Plumas County beardtongue	Occasional
Penstemon newberryi	Berry's penstemon	Occasional
Penstemon newberryi	mountain pride	Occasional
Penstemon newberryi	Sonoma penstemon	Occasional
Penstemon pahutensis	Paiute beardtongue	Occasional
Penstemon palmeri	Palmer's penstemon	Occasional
Penstemon papillatus	Inyo beardtongue	Occasional

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Penstemon patens	Lone Pine beardtongue	Occasional
Penstemon personatus	closethroat beardtongue	Occasional
Penstemon procerus	littleflower penstemon	Occasional
Penstemon procerus	pincushion beardtongue	Occasional
Penstemon pseudospectabilis	desert beardtongue	Occasional
Penstemon pseudospectabilis	desert penstemon	Occasional
Penstemon purpusii	Snow Mountain beardtongue	Occasional
Penstemon rattanii	Rattan's beardtongue	Occasional
Penstemon rattanii	Santa Cruz Mountains beardtongue	Occasional
Penstemon roezlii	Roezl's penstemon	Occasional
Penstemon rostriflorus	Bridge penstemon	Occasional
Penstemon rupicola	cliff beardtongue	Occasional
Penstemon rydbergii	herbaceous penstemon	Occasional
Penstemon rydbergii	Rydberg's penstemon	Occasional
Penstemon scapoides	pinyon beardtongue	Occasional
Penstemon speciosus	royal penstemon	Occasional
Penstemon spectabilis	showy penstemon	Occasional
Penstemon spp.	Penstemen	Occasional
Penstemon stephensii	Stephens' penstemon	Occasional
Penstemon strictus	Rocky Mountain penstemon	Occasional
Penstemon subglaber	smooth penstemon	Occasional
Penstemon sudans	Susanville beardtongue	Occasional
Penstemon thompsoniae	Thompson's beardtongue	Occasional
Penstemon thurberi	Thurber's penstemon	Occasional
Penstemon tracyi	Trinity penstemon	Occasional
Penstemon utahensis	Utah penstemon	Occasional
Penstemon venustus	Venus penstemon	Occasional
Perovskia atriplicifolia	Russian Sage	
Persea spp.	avocado, Florida mahogany, red bay	Primary
Persoonia spp.	bonewood, lance-leaf	Occasional
Petroselinum	parsley	Occasional
Petroselinum crispum	parsley	Occasional
Petroselinum spp.	parsley	Occasional
Phaseolus	bean	Common
Phaseolus filiformis	slimjim bean	Common
Phaseolus spp.	green bean, kidney bean, lima bean, snap bean, stringbean	Common
Philadelphus	mock orange	Occasional
Philadelphus ×insignis	summer mock orange	Occasional
Philadelphus argenteus	silver mock orange	Occasional
Philadelphus californicus	California mock orange	Occasional
Philadelphus confusus	Piper's mock orange	Occasional
Philadelphus cordifolius	heartleaf mock orange	Occasional
Philadelphus lewisii	Lewis' mock orange	Occasional
Philadelphus microphyllus	littleleaf mock orange	Occasional
Philadelphus oreganus	Oregon mock orange	Occasional
Philadelphus pumilus	dwarf mock orange	Occasional

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Philadelphus serpyllifolius	thymeleaf mock orange	Occasional
Philadelphus spp.		Occasional
Philadelphus trichothecus	Columbian mock orange	Occasional
Phlox	phlox	Occasional
Phlox adsurgens	northern phlox	Occasional
Phlox austromontana	mountain phlox	Occasional
Phlox austromontana	prostrate mountain phlox	Occasional
Phlox caespitosa	tufted phlox	Occasional
Phlox condensata		Occasional
Phlox covillei	Coville's phlox	Occasional
Phlox diffusa	spreading phlox	Occasional
Phlox dispersa	High Sierra phlox	Occasional
Phlox dolichantha	Big Bear Valley phlox	Occasional
Phlox douglasii		Occasional
Phlox grayi		Occasional
Phlox hirsuta	Yreka phlox	Occasional
Phlox hoodii	carpet phlox	Occasional
Phlox hoodii	musk phlox	Occasional
Phlox hoodii	spiny phlox	Occasional
Phlox longifolia	longleaf phlox	Occasional
Phlox muscoides		Occasional
Phlox pulvinata	cushion phlox	Occasional
Phlox rigida	stiff phlox	Occasional
Phlox speciosa	showy phlox	Occasional
Phlox spp.	phlox, sweet William	Occasional
Phlox stansburyi	cold-desert phlox	Occasional
Phlox superba		Occasional
Phlox viridis	green phlox	Occasional
Phormium spp.		Occasional
Photinia	chokeberry	Very Common
Photinia davidiana	Chinese photinia	Very Common
Photinia spp.	photinia	Very Common
Phyllanthus spp.	emblic, foliage flower, Otaheite gooseberry	Occasional
Physalis	groundcherry	Occasional
Physalis acutifolia	sharpleaf groundcherry	Occasional
Physalis angulata	cutleaf groundcherry	Occasional
Physalis cinerascens	Smallflower groundcherry	Occasional
Physalis cordata	heartleaf groundcherry	Occasional
Physalis crassifolia	yellow nightshade groundcherry	Occasional
Physalis grisea	strawberry-tomato	Occasional
Physalis hederifolia	Fendler's groundcherry	Occasional
Physalis hederifolia	ivyleaf groundcherry	Occasional
Physalis hederifolia	Palmer's groundcherry	Occasional
Physalis longifolia	longleaf groundcherry	Occasional
Physalis mollis	field groundcherry	Occasional
Physalis peruviana	Peruvian groundcherry	Occasional

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Physalis philadelphica	Mexican groundcherry	Occasional
Physalis pubescens	husk tomato	Occasional
Physalis spp.	ground cherry, husk tomato, tomatillo	Occasional
Picea	Spruce	Common
Picea breweriana	Brewer spruce	Common
Picea engelmannii	Engelmann spruce	Common
Picea sitchensis	Sitka spruce	Common
Picea spp.	spruce	Common
Pieris spp.	andromeda, fetterbrush, Japanese pieris, lily-of-the-valley bush	Common
Pinus	Pine	Common
Pinus ×attenuradiata		Common
Pinus albicaulis	whitebark pine	Common
Pinus attenuata	knobcone pine	Common
Pinus balfouriana	foxtail pine	Common
Pinus contorta	beach pine	Common
Pinus contorta	Bolander beach pine	Common
Pinus contorta	lodgepole pine	Common
Pinus contorta	Sierra lodgepole pine	Common
Pinus coulteri	Coulter pine	Common
Pinus edulis	twoneedle pinyon	Common
Pinus flexilis	limber pine	Common
Pinus halepensis	aleppo pine	Common
Pinus jeffreyi	Jeffrey pine	Common
Pinus lambertiana	sugar pine	Common
Pinus longaeva	Great Basin bristlecone pine	Common
Pinus monophylla	California pine	Common
Pinus monophylla	singleleaf pinyon	Common
Pinus monticola	western white pine	Common
Pinus muricata	Bishop pine	Common
Pinus pinea	Italian stone pine	Common
Pinus ponderosa	ponderosa pine	Common
Pinus quadrifolia	Parry pinyon	Common
Pinus radiata	Monterey pine	Common
Pinus sabiniana	California foothill pine	Common
Pinus spp.	Pines	Common
Pinus torreyana	Santa Cruz Island Torrey pine	Common
Pinus torreyana	Torrey pine	Common
Pinus washoensis	Washoe pine	Common
Pipturus spp.	Mamaki	
Pisum	Pea	Very Common
Pisum sativum	garden pea	Very Common
Pisum spp.	garden pea, English pea, snow pea, sugar pea	Very Common
Pittosporum	Cheesewood	
Pittosporum crassifolium	stiffleaf cheesewood	
Pittosporum spp.	Pittosporum	
Pittosporum tenuifolium	Tawhiwhi	

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Pittosporum tobira	Japanese cheesewood	
Pittosporum undulatum	Australian cheesewood	
Plantago	plantain	Common
Plantago aristata	largebracted plantain	Common
Plantago bigelovii	coast plantain	Common
Plantago coronopus	buckhorn plantain	Common
Plantago elongata	prairie plantain	Common
Plantago erecta	dotseed plantain	Common
Plantago eriopoda	redwool plantain	Common
Plantago firma	Chilean plantain	Common
Plantago lanceolata	narrowleaf plantain	Common
Plantago major	common plantain	Common
Plantago maritima	California goose tongue	Common
Plantago maritima	goose tongue	Common
Plantago ovata	desert Indianwheat	Common
Plantago patagonica	woolly plantain	Common
Plantago psyllium	sand plantain	Common
Plantago pusilla	dwarf plantain	Common
Plantago rhodosperma	redseed plantain	Common
Plantago spp.	Plantain	Common
Plantago subnuda	tall coastal plantain	Common
Plantago virginica	Virginia plantain	Common
Platysace spp.	native parsnip	Occasional
Plumbago	leadwort	Occasional
Plumbago auriculata	Cape leadwort	Occasional
Plumbago spp.	leadwort, plumbago	Occasional
Podranea spp.		
Polygala	Polygala	Occasional
Polygala acanthoclada	desert polygala	Occasional
Polygala californica	California milkwort	Occasional
Polygala cornuta	Sierra milkwort	Occasional
Polygala heterorhyncha	beaked spiny polygala	Occasional
Polygala intermontana	Intermountain milkwort	Occasional
Polygala myrtifolia	myrtle-leaf milkwort	Occasional
Polygala spp.	Milkworts	Occasional
Polygala subspinosa	spiny milkwort	Occasional
Polygonum	Knotweed	Common
Polygonum amphibium	longroot smartweed	Common
Polygonum amphibium	water knotweed	Common
Polygonum amphibium	water smartweed	Common
Polygonum arenastrum	oval-leaf knotweed	Common
Polygonum argyrocoleon	silversheath knotweed	Common
Polygonum baldschuanicum	Bukhara fleeceflower	Common
Polygonum bellardii	narrowleaf knotweed	Common
Polygonum bidwelliae	Bidwell's knotweed	Common
Polygonum bistortoides	American bistort	Common

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Polygonum bolanderi	Bolander's knotweed	Common
Polygonum californicum	California knotweed	Common
Polygonum capitatum	Pinkhead smartweed	Common
Polygonum convolvulus	black bindweed	Common
Polygonum cuspidatum	Japanese knotweed	Common
Polygonum davisiae	Davis' knotweed	Common
Polygonum douglasii	Austin knotweed	Common
Polygonum douglasii	Douglas' knotweed	Common
Polygonum douglasii	Johnston's knotweed	Common
Polygonum douglasii	large knotweed	Common
Polygonum douglasii	scatter knotweed	Common
Polygonum erectum	erect knotweed	Common
Polygonum fowleri	Fowler's knotweed	Common
Polygonum hickmanii	Hickman's knotweed	Common
Polygonum hydropiper	marshpepper knotweed	Common
Polygonum hydropiperoides	swamp smartweed	Common
Polygonum lapathifolium	curlytop knotweed	Common
Polygonum marinense	Marin knotweed	Common
Polygonum minimum	broadleaf knotweed	Common
Polygonum multiflorum	tuber fleeceflower	Common
Polygonum orientale	kiss me over the garden gate	Common
Polygonum paronychia	beach knotweed	Common
Polygonum parryi	Parry's knotweed	Common
Polygonum patulum	Bellard's smartweed	Common
Polygonum pensylvanicum	Pennsylvania smartweed	Common
Polygonum persicaria	spotted ladysthumb	Common
Polygonum phytolaccifolium	poke knotweed	Common
Polygonum polygaloides	fruitleaf knotweed	Common
Polygonum polygaloides	Kellogg's knotweed	Common
Polygonum polygaloides	milkwort knotweed	Common
Polygonum polygaloides	whitemargin knotweed	Common
Polygonum polystachyum	cultivated knotweed	Common
Polygonum punctatum	dotted smartweed	Common
Polygonum ramosissimum	bushy knotweed	Common
Polygonum ramosissimum	bushy knotweed	Common
Polygonum sachalinense	giant knotweed	Common
Polygonum shastense	Shasta knotweed	Common
Polygonum spp.	(fleece flower, knotweed, smartweed)	Common
Populus	cottonwood	Occasional
Populus ×canadensis	Carolina poplar	Occasional
Populus ×inopina		Occasional
Populus ×parryi		Occasional
Populus alba	white poplar	Occasional
Populus angustifolia	narrowleaf cottonwood	Occasional
Populus balsamifera	balsam poplar	Occasional
Populus balsamifera	black cottonwood	Occasional

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Populus deltoides		Occasional
Populus fremontii	Fremont cottonwood	Occasional
Populus nigra	Lombardy poplar	Occasional
Populus spp.	cottonwood, poplar	Occasional
Populus tremuloides	quaking aspen	Occasional
Primula	primrose	Occasional
Primula spp.	cowslip, primrose, primula	Occasional
Primula suffrutescens	Sierra primrose	Occasional
Protea spp.	Protea	
Prunus	plum	Very Common
Prunus akebono	flowering cherry	Very Common
Prunus andersonii	desert peach	Very Common
Prunus angustifolia	Chickasaw plum	Very Common
Prunus angustifolia	Chickasaw plum	Very Common
Prunus armeniaca	apricot	Very Common
Prunus avium	Cherry	Very Common
Prunus avium	Cherry	Very Common
Prunus caroliniana	Carolina Laurel cherry	Very Common
Prunus cerasifera		Very Common
Prunus domestica	Plum	Very Common
Prunus domestica	Plum	Very Common
Prunus dulcis	sweet almond	Very Common
Prunus emarginata	bitter cherry	Very Common
Prunus fasciculata	desert almond	Very Common
Prunus fremontii	desert apricot	Very Common
Prunus ilicifolia	hollyleaf cherry	Very Common
Prunus laurel	Laurel	Very Common
Prunus laurocerasus	cherry laurel	Very Common
Prunus lusitanica	Portugal laurel	Very Common
Prunus lyonii	Catalina cherry	Very Common
Prunus mahaleb	Mahaleb cherry	Very Common
Prunus persica	peach	Very Common
Prunus serrulata		Very Common
Prunus spp.		Very Common
Prunus spp.	Japanese weeping cherry	Very Common
Prunus spp.	Double weeping rosebud cherry	Very Common
Prunus spp.	Pluot	Very Common
Prunus subcordata	Kellogg's Klamath plum	Very Common
Prunus subcordata	Klamath plum	Very Common
Prunus subcordata	Oregon Klamath plum	Very Common
Prunus virginiana	black chokecherry	Very Common
Prunus virginiana	chokecherry	Very Common
Prunus virginiana	western chokecherry	Very Common
Pseudopanax spp.	five-finger, lancewood	
Pseudotsuga	Douglas-fir	Common
Pseudotsuga macrocarpa	bigcone Douglas-fir	Common

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Pseudotsuga menziesii	Douglas-fir	Common
Pseudotsuga spp.	big-cone pine, Douglas-fir, Japanese Douglas-fir	Common
Pseudowintera spp.	Horpito	Occasional
Psidium cattleianum	Strawberry guava	
Pteridium	brackenfern	Common
Pteridium aquilinum	hairy brackenfern	Common
Pteridium aquilinum	western brackenfern	Common
Pteridium spp.	Brackenfern	Common
Pteris	brake fern	Occasional
Pteris cretica	Cretan brake	Occasional
Pteris felix		Occasional
Pteris multifida	spider brake	Occasional
Pteris spp.	brake, dish fern, table fern	Occasional
Pteris tremula	Australian brake	Occasional
Pteris vittata	ladder brake	Occasional
Pulicaria	false fleabane	
Pulicaria paludosa	Spanish false fleabane	
Pulicaria spp.	false fleabane	
Pyracantha	firethorn	Very Common
Pyracantha angustifolia	narrowleaf firethorn	Very Common
Pyracantha coccinea	scarlet firethorn	Very Common
Pyracantha crenulata	Nepalese firethorn	Very Common
Pyracantha fortuneana	Chinese firethorn	Very Common
Pyracantha spp.	fire thorn, pyracantha	Very Common
Pyrus	pear	Very Common
Pyrus communis	common pear	Very Common
Pyrus spp.	Asian pear	Very Common
Pyrus spp.	pear	Very Common
Quercus	oak	Occasional
Quercus ×acutidens		Occasional
Quercus ×alvordiana	Alvord oak	Occasional
Quercus ×eplingii		Occasional
Quercus ×ganderi		Occasional
Quercus ×grandidentata		Occasional
Quercus ×howellii		Occasional
Quercus ×jolonensis		Occasional
Quercus ×macdonaldii	MacDonald oak	Occasional
Quercus ×moreha	oracle oak	Occasional
Quercus ×munzii		Occasional
Quercus ×subconvexa		Occasional
Quercus ×townei		Occasional
Quercus agrifolia	California live oak	Occasional
Quercus agrifolia	coastal live oak	Occasional
Quercus berberidifolia	scrub oak	Occasional
Quercus cedrosensis	Cedros Island oak	Occasional
Quercus chrysolepis	canyon live oak	Occasional

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Quercus cornelius-mulleri	Muller oak	Occasional
Quercus douglasii	blue oak	Occasional
Quercus dumosa	coastal sage scrub oak	Occasional
Quercus durata	leather oak	Occasional
Quercus engelmannii	Engelmann oak	Occasional
Quercus garryana	Oregon white oak	Occasional
Quercus ilex	holly oak	Occasional
Quercus john-tuckeri	Tucker oak	Occasional
Quercus kelloggii	California black oak	Occasional
Quercus lobata	valley oak	Occasional
Quercus pacifica	Channel Island scrub oak	Occasional
Quercus palmeri	Palmer oak	Occasional
Quercus parvula	coast oak	Occasional
Quercus parvula	Santa Cruz Island oak	Occasional
Quercus parvula	Shreve oak	Occasional
Quercus parvula	Tamalpais oak	Occasional
Quercus sadleriana	deer oak	Occasional
Quercus spp.	oak	Occasional
Quercus tomentella	island live oak	Occasional
Quercus turbinella	Sonoran scrub oak	Occasional
Quercus vacciniifolia	huckleberry oak	Occasional
Quercus wislizeni	interior live oak	Occasional
Racosperma spp.	wattle	Very Common
Ranunculus	buttercup	Common
Ranunculus acris	showy buttercup	Common
Ranunculus acris	tall buttercup	Common
Ranunculus alismifolius	plantainleaf buttercup	Common
Ranunculus andersonii	Anderson's buttercup	Common
Ranunculus aquatilis	white water crowfoot	Common
Ranunculus arvensis	corn buttercup	Common
Ranunculus bonariensis	Carter's buttercup	Common
Ranunculus bulbosus	St. Anthony's turnip	Common
Ranunculus californicus	California buttercup	Common
Ranunculus canus	Sacramento Valley buttercup	Common
Ranunculus cortusifolius	Azores buttercup	Common
Ranunculus cymbalaria	alkali buttercup	Common
Ranunculus eschscholtzii	Eschscholtz's buttercup	Common
Ranunculus flabellaris	yellow water buttercup	Common
Ranunculus flammula	greater creeping spearwort	Common
Ranunculus flammula	greater creeping spearwort	Common
Ranunculus glaberrimus	elliptical buttercup	Common
Ranunculus glaberrimus	sagebrush buttercup	Common
Ranunculus gormanii	Gorman's buttercup	Common
Ranunculus hebecarpus	delicate buttercup	Common
Ranunculus hydrocharoides	frogbit buttercup	Common
Ranunculus lobbii	Lobb's buttercup	Common

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Ranunculus longirostris	longbeak buttercup	Common
Ranunculus macounii	Macoun's buttercup	Common
Ranunculus muricatus	spinyfruit buttercup	Common
Ranunculus occidentalis	western buttercup	Common
Ranunculus orthorhynchus	Bloomer's buttercup	Common
Ranunculus orthorhynchus	straightbeak buttercup	Common
Ranunculus parviflorus	smallflower buttercup	Common
Ranunculus populago	popular buttercup	Common
Ranunculus pusillus	low spearwort	Common
Ranunculus repens	creeping buttercup	Common
Ranunculus sardous	hairy buttercup	Common
Ranunculus sceleratus	cursed buttercup	Common
Ranunculus spp.	buttercups, crowfoot	Common
Ranunculus suksdorfii	Suksdorf's buttercup	Common
Ranunculus trichophyllus	threadleaf crowfoot	Common
Ranunculus uncinatus	Idaho buttercup	Common
Ranunculus uncinatus	woodland buttercup	Common
Ranunculus verecundus	wetslope buttercup	Common
Raphanus	radish	Occasional
Raphanus raphanistrum	wild radish	Occasional
Raphanus sativus	cultivated radish	Occasional
Raphanus spp.	wild radish	Occasional
Reseda	mignonette	Occasional
Reseda alba	white upright mignonette	Occasional
Reseda lutea	yellow mignonette	Occasional
Reseda luteola	Weld	Occasional
Reseda odorata	garden mignonette	Occasional
Reseda spp.	mignonette	Occasional
Rhamnus	buckthorn	
Rhamnus alnifolia	alderleaf buckthorn	
Rhamnus alternus	Itialian Buchthorn	
Rhamnus cathartica	common buckthorn	
Rhamnus crocea	hollyleaf buckthorn	
Rhamnus crocea	redberry buckthorn	
Rhamnus ilicifolia	hollyleaf redberry	
Rhamnus pirifolia	island redberry	
Rhamnus spp.	Rhamnus	
Rhaphiolepis spp.	Japanese-hawthorn	Very Common
Rhododendron	rhododendron	Common
Rhododendron ×columbianum		Common
Rhododendron macrophyllum	Pacific rhododendron	Common
Rhododendron neoglandulosum		Common
Rhododendron occidentale	Sonoma azalea	Common
Rhododendron occidentale	western azalea	Common
Rhododendron spp.	azalea, rhododendron	Common
Ribes	currant	Very Common

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Ribes amarum	bitter gooseberry	Very Common
Ribes aureum	golden currant	Very Common
Ribes binominatum	ground gooseberry	Very Common
Ribes bracteosum	stink currant	Very Common
Ribes californicum	hillside gooseberry	Very Common
Ribes canthariforme	Moreno currant	Very Common
Ribes cereum	wax currant	Very Common
Ribes cereum	whisky currant	Very Common
Ribes cruentum	shinyleaf currant	Very Common
Ribes divaricatum	Parish's gooseberry	Very Common
Ribes divaricatum	spreading gooseberry	Very Common
Ribes divaricatum	straggly gooseberry	Very Common
Ribes hudsonianum	northern black currant	Very Common
Ribes hudsonianum	western black currant	Very Common
Ribes indecorum	whiteflower currant	Very Common
Ribes inerme	Klamath gooseberry	Very Common
Ribes inerme	whitestem gooseberry	Very Common
Ribes lacustre	prickly currant	Very Common
Ribes lasianthum	alpine gooseberry	Very Common
Ribes laxiflorum	trailing black currant	Very Common
Ribes lobbii	gummy gooseberry	Very Common
Ribes malvaceum	chaparral currant	Very Common
Ribes marshallii	Hupa gooseberry	Very Common
Ribes menziesii	canyon gooseberry	Very Common
Ribes montigenum	gooseberry currant	Very Common
Ribes nevadense	Jaeger's currant	Very Common
Ribes nevadense	Sierra currant	Very Common
Ribes quercetorum	rock gooseberry	Very Common
Ribes roezlii	Sierra gooseberry	Very Common
Ribes sanguineum		Very Common
Ribes sanguineum		Very Common
Ribes sericeum	Lucia gooseberry	Very Common
Ribes speciosum	fuchsiaflower gooseberry	Very Common
Ribes spp.		Very Common
Ribes thacherianum	Santa Cruz gooseberry	Very Common
Ribes tularense	Tulare gooseberry	Very Common
Ribes velutinum	desert gooseberry	Very Common
Ribes velutinum	Gooding's gooseberry	Very Common
Ribes viburnifolium	island gooseberry	Very Common
Ribes victoris	Victor's gooseberry	Very Common
Ribes viscosissimum	sticky currant	Very Common
Ripogonum spp.	Supplejack	Occasional
Robinia	Locust	
Robinia hispida	bristly locust	
Robinia neomexicana	New Mexico locust	
Robinia pseudoacacia	black locust	

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Robinia spp.	locust	
Rosa	rose	Very Common
Rosa ?pinetorum	pine rose	Very Common
Rosa bridgesii	pygmy rose	Very Common
Rosa californica	California wildrose	Very Common
Rosa canina	dog rose	Very Common
Rosa eglanteria	sweetbriar rose	Very Common
Rosa gymnocarpa	dwarf rose	Very Common
Rosa minutifolia	Baja rose	Very Common
Rosa multiflora	multiflora rose	Very Common
Rosa nutkana	Nootka rose	Very Common
Rosa pisocarpa	cluster rose	Very Common
Rosa sicula	Mediterranean rose	Very Common
Rosa spithamea	ground rose	Very Common
Rosa spithamea	Sonoma ground rose	Very Common
Rosa spp.	Rose	Very Common
Rosa woodsii	Tehachapi rose	Very Common
Rosa woodsii	Woods' rose	Very Common
Rosa yainacensis	Cascade rose	Very Common
Rubus	blackberry	Primary
Rubus aboriginum	garden dewberry	Primary
Rubus allegheniensis	Allegheny blackberry	Primary
Rubus armeniacus	Himalayan blackberry	Primary
Rubus glaucifolius	Cuyamaca raspberry	Primary
Rubus glaucifolius	San Diego raspberry	Primary
Rubus idaeus	American red raspberry	Primary
Rubus idaeus	grayleaf red raspberry	Primary
Rubus laciniatus	cutleaf blackberry	Primary
Rubus lasiococcus	roughfruit berry	Primary
Rubus leucodermis	whitebark raspberry	Primary
Rubus nivalis	snow raspberry	Primary
Rubus parviflorus	thimbleberry	Primary
Rubus spectabilis	salmonberry	Primary
Rubus spp.	blackberry, boysenberry, raspberry	Primary
Rubus ulmifolius	elmleaf blackberry	Primary
Rubus ursinus	California blackberry	Primary
Rubus vitifolius	Pacific dewberry	Primary
Rudbeckia	coneflower	
Rudbeckia californica	California coneflower	
Rudbeckia glaucescens	waxy coneflower	
Rudbeckia hirta	blackeyed Susan	
Rudbeckia klamathensis	Klamath coneflower	
Rudbeckia occidentalis	western coneflower	
Rumex	dock	Common
Rumex ×acutus		Common
Rumex acetosella	common sheep sorrel	Common

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Rumex aquaticus	western dock	Common
Rumex conglomeratus	clustered dock	Common
Rumex crispus	curly dock	Common
Rumex dentatus	toothed dock	Common
Rumex frutescens	wedgeleaf dock	Common
Rumex hymenosepalus	canaigre dock	Common
Rumex kerneri	Kerner's dock	Common
Rumex maritimus	golden dock	Common
Rumex obtusifolius	bitter dock	Common
Rumex occidentalis		Common
Rumex orbiculatus	greater water dock	Common
Rumex paucifolius	alpine sheep sorrel	Common
Rumex pulcher	fiddle dock	Common
Rumex salicifolius	lake willow dock	Common
Rumex salicifolius	Mexican dock	Common
Rumex salicifolius	toothed willow dock	Common
Rumex salicifolius	willow dock	Common
Rumex sanguineus	redvein dock	Common
Rumex spp.	common sheep sorrel, dock, garden sorrel	Common
Rumex stenophyllus	narrowleaf dock	Common
Rumex venosus	Veiny dock	Common
Rumex violascens	Violet dock	Common
Salix	Willow	Occasional
Salix ×ehrhartiana		Occasional
Salix ×pendulina	Wisconsin weeping willow	Occasional
Salix ×rubens	hybrid crack willow	Occasional
Salix ×sepulcralis	weeping willow	Occasional
Salix alba	white willow	Occasional
Salix arctica		Occasional
Salix bebbiana	Bebb willow	Occasional
Salix boothii	Booth's willow	Occasional
Salix brachycarpa	shortfruit willow	Occasional
Salix breweri	Brewer's willow	Occasional
Salix delnortensis	Del Norte willow	Occasional
Salix drummondiana	Drummond's willow	Occasional
Salix eastwoodiae	mountain willow	Occasional
Salix eriocephala		Occasional
Salix exigua	narrowleaf willow	Occasional
Salix geyeriana	Geyer willow	Occasional
Salix gooddingii	Goodding's willow	Occasional
Salix hookeriana	dune willow	Occasional
Salix jepsonii	Jepson's willow	Occasional
Salix laevigata	red willow	Occasional
Salix lasiolepis	arroyo willow	Occasional
Salix lasiolepis	Bigelow's willow	Occasional
Salix lemmonii	Lemmon's willow	Occasional

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Salix ligulifolia	strapleaf willow	Occasional
Salix lucida	greenleaf willow	Occasional
Salix lucida	Pacific willow	Occasional
Salix lucida	shining willow	Occasional
Salix lutea	yellow willow	Occasional
Salix melanopsis	dusky willow	Occasional
Salix nivalis	snow willow	Occasional
Salix orestera	Sierra willow	Occasional
Salix petrophila	alpine willow	Occasional
Salix planifolia	diamondleaf willow	Occasional
Salix planifolia	diamondleaf willow	Occasional
Salix prolixa	MacKenzie's willow	Occasional
Salix reticulata		Occasional
Salix scouleriana	Scouler's willow	Occasional
Salix sessilifolia	northwest sandbar willow	Occasional
Salix sitchensis	Sitka willow	Occasional
Salix spp.	Willow	Occasional
Salix tracyi	Tracy's willow	Occasional
Salvia	sage	Occasional
Salvia ×bernardina		Occasional
Salvia ×palmeri		Occasional
Salvia aethiopis	Mediterranean sage	Occasional
Salvia apiana	compact white sage	Occasional
Salvia apiana	white sage	Occasional
Salvia brandegeei	Santa Rosa Island sage	Occasional
Salvia carduacea	thistle sage	Occasional
Salvia clevelandii		Occasional
Salvia columbariae	chia	Occasional
Salvia columbariae	Ziegler's sage	Occasional
Salvia dorrii	purple sage	Occasional
Salvia eremostachya	rose sage	Occasional
Salvia funerea	woolly sage	Occasional
Salvia greatae	lavender sage	Occasional
Salvia leucophylla	San Luis purple sage	Occasional
Salvia longistyla	Mexican sage	Occasional
Salvia mellifera	black sage	Occasional
Salvia microphylla	baby sage	Occasional
Salvia mohavensis	Mojave sage	Occasional
Salvia munzii	Munz's sage	Occasional
Salvia officinalis	kitchen sage	Occasional
Salvia pachyphylla	blue sage	Occasional
Salvia reflexa	lanceleaf sage	Occasional
Salvia sonomensis	creeping sage	Occasional
Salvia spathacea	hummingbird sage	Occasional
Salvia spp.	Sage	Occasional
Salvia vaseyi	scallopleaf sage	Occasional

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Salvia verbenaca	wild clary	Occasional
Salvia virgata	wand sage	Occasional
Sambucus	elderberry	Occasional
Sambucus cerulea		Occasional
Sambucus nigra	blue elder	Occasional
Sambucus nigra	common elderberry	Occasional
Sambucus nigra	European black elderberry	Occasional
Sambucus racemosa	black elderberry	Occasional
Sambucus racemosa	red elderberry	Occasional
Sambucus spp.	Elderberry	Occasional
Santalum spp.	sandalwood	
Schlumbergera spp.	Zygocatus spp. (Christmas cactus, claw cactus, crab cactus)	
Senecio	ragwort	Common
Senecio aphanactis	chaparral ragwort	Common
Senecio aronicoides	rayless ragwort	Common
Senecio astephanus	San Gabriel ragwort	Common
Senecio blochmaniae	dune ragwort	Common
Senecio californicus	California ragwort	Common
Senecio cineraria	silver ragwort	Common
Senecio clarkianus	Clark's ragwort	Common
Senecio elegans	redpurple ragwort	Common
Senecio flaccidus	Douglas' ragwort	Common
Senecio flaccidus	Mono ragwort	Common
Senecio flaccidus	threadleaf ragwort	Common
Senecio fremontii	dwarf mountain ragwort	Common
Senecio hydrophiloides	tall groundsel	Common
Senecio hydrophilus	water ragwort	Common
Senecio integerrimus	Columbia ragwort	Common
Senecio integerrimus	lambstongue ragwort	Common
Senecio integerrimus	paleyellow ragwort	Common
Senecio jacobaea	stinking willie	Common
Senecio lyonii	island senecio	Common
Senecio mohavensis	Mojave ragwort	Common
Senecio pattersonensis	Patterson's senecio	Common
Senecio scorzonella	Sierra ragwort	Common
Senecio serra	tall ragwort	Common
Senecio spartioides	broomlike ragwort	Common
Senecio spp.	dusty-miller, groundsels	Common
Senecio squalidus	oxford ragwort	Common
Senecio sylvaticus	woodland ragwort	Common
Senecio triangularis	arrowleaf ragwort	Common
Senecio vulgaris	old-man-in-the-Spring	Common
Sequoia	Redwood	
Sequoia sempervirens	Redwood	
Sequoia spp.	coast redwood	
Sida	fanpetals	Occasional

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Sida abutifolia	spreading fanpetals	Occasional
Sida rhombifolia	Cuban jute	Occasional
Sida spinosa	prickly fanpetals	Occasional
Sida spp.	fanpetals, Virginia mallow	Occasional
Sisymbrium	hedgemustard	Common
Sisymbrium altissimum	tall tumblemustard	Common
Sisymbrium erysimoides	Mediterranean rocket	Common
Sisymbrium irio	London rocket	Common
Sisymbrium loeselii	small tumbleweed mustard	Common
Sisymbrium officinale	hedgemustard	Common
Sisymbrium orientale	Indian hedgemustard	Common
Sisymbrium spp.	hedge mustard	Common
Smilax	greenbrier	Occasional
Smilax californica	California greenbrier	Occasional
Smilax jamesii	English Peak greenbrier	Occasional
Smilax spp.	greenbrier, Jacob’s ladder, wild sarsaparilla	Occasional
Solanum	nightshade	Occasional
Solanum americanum	American black nightshade	Occasional
Solanum aviculare	New Zealand nightshade	Occasional
Solanum cardiophyllum	heartleaf horsenettle	Occasional
Solanum carolinense	Carolina horsenettle	Occasional
Solanum clokeyi	Clokey's nightshade	Occasional
Solanum dimidiatum	western horsenettle	Occasional
Solanum douglasii	greenspot nightshade	Occasional
Solanum dulcamara	climbing nightshade	Occasional
Solanum elaeagnifolium	silverleaf nightshade	Occasional
Solanum furcatum	forked nightshade	Occasional
Solanum gayanum	Chilean nightshade	Occasional
Solanum heterodoxum	melonleaf nightshade	Occasional
Solanum lanceolatum	orangeberry nightshade	Occasional
Solanum lycopersicum	garden tomato	Occasional
Solanum marginatum	purple African nightshade	Occasional
Solanum mauritianum	earleaf nightshade	Occasional
Solanum nigrum	black nightshade	Occasional
Solanum parishii	Parish's nightshade	Occasional
Solanum peruvianum	Peruvian nightshade	Occasional
Solanum physalifolium	hoe nightshade	Occasional
Solanum rostratum	buffalobur nightshade	Occasional
Solanum scabrum	garden-huckleberry	Occasional
Solanum sisymbriifolium	sticky nightshade	Occasional
Solanum spp.	horse nettles, nightshade, pepino, potato	Occasional
Solanum tenuilobatum	San Diego nightshade	Occasional
Solanum triflorum	cutleaf nightshade	Occasional
Solanum tuberosum	Irish potato	Occasional
Solanum umbelliferum	bluewitch	Occasional
Solanum umbelliferum	bluewitch nightshade	Occasional

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Solanum villosum	hairy nightshade	Occasional
Solanum wallacei	Catalina nightshade	Occasional
Solanum xanti	chaparral nightshade	Occasional
Solanum xanti	Hoffmann's nightshade	Occasional
Solanum xanti	San Luis Obispo nightshade	Occasional
Solidago	goldenrod	Common
Solidago altissima	late goldenrod	Common
Solidago californica	California goldenrod	Common
Solidago canadensis	Canada goldenrod	Common
Solidago canadensis	salebrosa goldenrod	Common
Solidago gigantea	giant goldenrod	Common
Solidago guiradonis	Guirado goldenrod	Common
Solidago lepida		Common
Solidago multiradiata	manyray goldenrod	Common
Solidago multiradiata	Rocky Mountain goldenrod	Common
Solidago simplex	Mt. Albert goldenrod	Common
Solidago spathulata		Common
Solidago spectabilis	Nevada goldenrod	Common
Solidago spp.	California goldenrod, Canada goldenrod, goldenrod	Common
Solidago velutina	threenerve goldenrod	Common
Sollya	sollya	
Sollya heterophylla	bluebell creeper	
Sollya spp.	Australian bluebells, bluebell creeper	
Sonchus	Sowthistle	Common
Sonchus arvensis	field sowthistle	Common
Sonchus asper	spiny sowthistle	Common
Sonchus oleraceus	common sowthistle	Common
Sonchus spp.	sowthistle	Common
Sonchus tenerrimus	slender sowthistle	Common
Sophora spp.	sophora	
Spergula	spurry	Occasional
Spergula arvensis	corn spurry	Occasional
Spergula spp.	corn spurry, spurry	Occasional
Spiraea	spirea	
Spiraea douglasii	rose spirea	
Spiraea splendens	rose meadowsweet	
Spiraea spp.	spiraea	
Syringa spp.	lilac	Occasional
Teucrium	germander	
Teucrium canadense	Canada germander	
Teucrium canadense	western germander	
Teucrium cubense	small coastal germander	
Teucrium fruticans	shrubby germander	
Teucrium glandulosum	common germander	
Teucrium spp.	Germander	
Thuja	red cedar	Occasional

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Thuja plicata	western red cedar	Occasional
Thuja spp.	cedar, giant cedar, Oriental arborvitae, red cedar, white cedar	Occasional
Tibouchina spp.	glory bush, lasiandra, pleroma, princess flower	Occasional
Tibouchina urvilleana	Princess Flower	Occasional
Tithonia spp.	Mexican sunflower	Common
Tolmiea	youth on age	
Tolmiea menziesii	Piggy-back Plant	
Trachelospermum jasminoides	Star Jasmine	
Tradescantia	spiderwort	Occasional
Tradescantia fluminensis	small-leaf spiderwort	Occasional
Tradescantia spp.		Occasional
Tradescantia virginiana	Virginia spiderwort	Occasional
Trifolium	clover	Very Common
Trifolium albopurpureum	rancheria clover	Very Common
Trifolium alexandrinum	Egyptian clover	Very Common
Trifolium amoenum	showy Indian clover	Very Common
Trifolium andersonii	Beatley's clover	Very Common
Trifolium andersonii	fiveleaf clover	Very Common
Trifolium andersonii	Mono clover	Very Common
Trifolium angustifolium	narrowleaf crimson clover	Very Common
Trifolium arvense	rabbitfoot clover	Very Common
Trifolium aureum	golden clover	Very Common
Trifolium barbigerum	Andrews' clover	Very Common
Trifolium barbigerum	bearded clover	Very Common
Trifolium beckwithii	Beckwith's clover	Very Common
Trifolium bifidum	notchleaf clover	Very Common
Trifolium bolanderi	parasol clover	Very Common
Trifolium breweri	forest clover	Very Common
Trifolium buckwestiorum	Santa Cruz clover	Very Common
Trifolium campestre	field clover	Very Common
Trifolium cernuum	nodding clover	Very Common
Trifolium ciliolatum	foothill clover	Very Common
Trifolium cyathiferum	cup clover	Very Common
Trifolium dedeckerae	Dedecker's clover	Very Common
Trifolium depauperatum	balloon sack clover	Very Common
Trifolium depauperatum	cowbag clover	Very Common
Trifolium dichotomum	branched Indian clover	Very Common
Trifolium dubium	suckling clover	Very Common
Trifolium eriocephalum	Cusick's clover	Very Common
Trifolium eriocephalum	woollyhead clover	Very Common
Trifolium fragiferum	strawberry clover	Very Common
Trifolium fucatum	bull clover	Very Common
Trifolium gemellum	Spanish clover	Very Common
Trifolium glomeratum	clustered clover	Very Common
Trifolium gracilentum	Palmer's clover	Very Common
Trifolium gracilentum	pinpoint clover	Very Common

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Trifolium gymnocarpon	hollyleaf clover	Very Common
Trifolium gymnocarpon	Plummer's clover	Very Common
Trifolium hirtum	rose clover	Very Common
Trifolium howellii	canyon clover	Very Common
Trifolium hybridum	alsike clover	Very Common
Trifolium incarnatum	crimson clover	Very Common
Trifolium jokerstii	Jim's clover	Very Common
Trifolium kingii		Very Common
Trifolium lemmonii	Lemmon's clover	Very Common
Trifolium longipes	Elmer's clover	Very Common
Trifolium longipes	Hansen's clover	Very Common
Trifolium longipes	longstalk clover	Very Common
Trifolium longipes	Oregon clover	Very Common
Trifolium macilentum		Very Common
Trifolium macraei	Chilean clover	Very Common
Trifolium macrocephalum	largehead clover	Very Common
Trifolium microcephalum	smallhead clover	Very Common
Trifolium microdon	thimble clover	Very Common
Trifolium minutissimum	dwarf clover	Very Common
Trifolium monanthum	mountain carpet clover	Very Common
Trifolium mucronatum		Very Common
Trifolium obtusiflorum	clammy clover	Very Common
Trifolium oliganthum	fewflower clover	Very Common
Trifolium olivaceum	olive clover	Very Common
Trifolium polyodon		Very Common
Trifolium pratense	red clover	Very Common
Trifolium productum	Shasta clover	Very Common
Trifolium repens	white clover	Very Common
Trifolium resupinatum	reversed clover	Very Common
Trifolium retusum	teasel clover	Very Common
Trifolium siskiyouense	Siskiyou clover	Very Common
Trifolium spp.	clover	Very Common
Trifolium stellatum	star clover	Very Common
Trifolium striatum	knotted clover	Very Common
Trifolium subterraneum	subterranean clover	Very Common
Trifolium tomentosum	woolly clover	Very Common
Trifolium trichocalyx	Monterey clover	Very Common
Trifolium variegatum	whitetip clover	Very Common
Trifolium vesiculosum	arrowleaf clover	Very Common
Trifolium willdenovii		Very Common
Trifolium willdenowii	tomcat clover	Very Common
Trifolium wormskioldii	cows clover	Very Common
Triglochin	arrowgrass	Occasional
Triglochin concinna	slender arrowgrass	Occasional
Triglochin maritima	seaside arrowgrass	Occasional
Triglochin palustris	marsh arrowgrass	Occasional

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Triglochin spp.	arrow grass	Occasional
Triglochin striata	three-rib arrowgrass	Occasional
Ulex	gorse	Very Common
Ulex europaeus	common gorse	Very Common
Ulex spp.	furze, gorse, whin	Very Common
Ulma spp.		
Umbellularia	California laurel	
Umbellularia californica	California Bay Laurel	
Umbellularia californica	California Bay Laurel	
Urtica	nettle	Common
Urtica dioica	California nettle	Common
Urtica dioica	stinging nettle	Common
Urtica spp.	nettles, stinging nettles	Common
Urtica urens	dwarf nettle	Common
Vaccinium	blueberry	Common
Vaccinium caespitosum	dwarf bilberry	Common
Vaccinium cespitosum		Common
Vaccinium deliciosum	Cascade bilberry	Common
Vaccinium macrocarpon	cranberry	Common
Vaccinium membranaceum	thinleaf huckleberry	Common
Vaccinium ovatum	California huckleberry	Common
Vaccinium parvifolium	red huckleberry	Common
Vaccinium scoparium	grouse whortleberry	Common
Vaccinium spp.	Blueberry	Common
Vaccinium uliginosum	bog blueberry	Common
Verbena	vervain	Occasional
Verbena ×clemensiorum	Amador County vervain	Occasional
Verbena abramsii	San Bernardino vervain	Occasional
Verbena bonariensis	purpletop vervain	Occasional
Verbena bracteata	bigbract verbena	Occasional
Verbena brasiliensis	Brazilian vervain	Occasional
Verbena californica	Red Hills vervain	Occasional
Verbena canescens	gray vervain	Occasional
Verbena hastata	swamp verbena	Occasional
Verbena lasiostachys	western vervain	Occasional
Verbena litoralis	seashore vervain	Occasional
Verbena menthifolia	mint vervain	Occasional
Verbena neomexicana	hillside vervain	Occasional
Verbena officinalis	herb of the cross	Occasional
Verbena rigida	tuberous vervain	Occasional
Verbena robusta		Occasional
Verbena scabra	sandpaper vervain	Occasional
Verbena spp.	verbena, vervain	Occasional
Veronica	speedwell	Occasional
Veronica americana	American speedwell	Occasional
Veronica anagallis-aquatica	water speedwell	Occasional

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Veronica arvensis	corn speedwell	Occasional
Veronica beccabunga	European speedwell	Occasional
Veronica catenata		Occasional
Veronica chamaedrys	germander speedwell	Occasional
Veronica copelandii	Copeland's speedwell	Occasional
Veronica cusickii	Cusick's speedwell	Occasional
Veronica filiformis	threadstalk speedwell	Occasional
Veronica hederifolia	ivyleaf speedwell	Occasional
Veronica officinalis	common gypsyweed	Occasional
Veronica peregrina	hairy purslane speedwell	Occasional
Veronica peregrina	neckweed	Occasional
Veronica persica	birdeye speedwell	Occasional
Veronica scutellata	skullcap speedwell	Occasional
Veronica serpyllifolia	brightblue speedwell	Occasional
Veronica serpyllifolia	thymeleaf speedwell	Occasional
Veronica spp.	brooklime, speedwell	Occasional
Veronica triphyllos	finger speedwell	Occasional
Veronica wormskjoldii	American alpine speedwell	Occasional
Viburnum	viburnum	Occasional
Viburnum ellipticum	common viburnum	Occasional
Viburnum spp.	Arrowwoods	Occasional
Viburnum tinus	Viburnum	Occasional
Vicia	vetch	Primary
Vicia disperma	European vetch	Primary
Vicia americana	American vetch	Primary
Vicia articulata	oneflower vetch	Primary
Vicia benghalensis	reddish tufted vetch	Primary
Vicia bithynica	Bithynian vetch	Primary
Vicia cracca	bird vetch	Primary
Vicia faba	horsebean	Primary
Vicia hassei	Hasse's vetch	Primary
Vicia hirsuta	tiny vetch	Primary
Vicia lathyroides	spring vetch	Primary
Vicia ludoviciana	Louisiana vetch	Primary
Vicia lutea	smooth yellow vetch	Primary
Vicia nigricans	black vetch	Primary
Vicia nigricans	giant vetch	Primary
Vicia pannonica	Hungarian vetch	Primary
Vicia sativa	garden vetch	Primary
Vicia spp.	broad bean, tare, vetch	Primary
Vicia tetrasperma	lentil vetch	Primary
Vicia villosa	winter vetch	Primary
Vinca	Periwinkle	Occasional
Vinca major	bigleaf periwinkle	Occasional
Vinca minor	Vinca	Occasional
Vinca spp.	Periwinkles	Occasional

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Viola	Violet	Occasional
Viola adunca	hookedspur violet	Occasional
Viola adunca	Kirk's violet	Occasional
Viola arvensis	European field pansy	Occasional
Viola aurea	golden violet	Occasional
Viola bakeri	Baker's violet	Occasional
Viola beckwithii	Beckwith's violet	Occasional
Viola beckwithii	western pansy	Occasional
Viola californica	California violet	Occasional
Viola canadensis		Occasional
Viola cuneata	wedgeleaf violet	Occasional
Viola douglasii	Douglas' golden violet	Occasional
Viola epipsila	dwarf marsh violet	Occasional
Viola epipsila	dwarf marsh violet	Occasional
Viola glabella	pioneer violet	Occasional
Viola hallii	Oregon violet	Occasional
Viola howellii		Occasional
Viola lanceolata	bog white violet	Occasional
Viola langsdorfii	Aleutian violet	Occasional
Viola lobata	pine violet	Occasional
Viola macloskeyi	small white violet	Occasional
Viola macloskeyi	smooth white violet	Occasional
Viola nephrophylla	northern bog violet	Occasional
Viola ocellata	pinto violet	Occasional
Viola odorata	sweet violet	Occasional
Viola palustris	marsh violet	Occasional
Viola palustris	marsh violet	Occasional
Viola pedunculata	Johnny-jump-up	Occasional
Viola pinetorum	goosefoot yellow violet	Occasional
Viola praemorsa	canary violet	Occasional
Viola praemorsa	upland yellow violet	Occasional
Viola psychodes	butterfly violet	Occasional
Viola purpurea	goosefoot violet	Occasional
Viola sempervirens	evergreen violet	Occasional
Viola sheltonii	Shelton's violet	Occasional
Viola sororia		Occasional
Viola spp.		Occasional
Viola tomentosa	feltleaf violet	Occasional
Viola tricolor	johnny jumpup	Occasional
Viola vallicola	sagebrush violet	Occasional
Viola vallicola	valley violet	Occasional
Vitis	grape	Very Common
Vitis aestivalis	summer grape	Very Common
Vitis aestivalis	summer grape	Very Common
Vitis californica	California wild grape	Very Common
Vitis girdiana	desert wild grape	Very Common

Appendix A, continued.

Genus Species	Common Name	Genus Match Host Prevalence
Vitis rupestris	sand grape	Very Common
Vitis spp.	grape	Very Common
Vitis vinifera	wine grape	Very Common
Weigela spp.	weigela	Occasional
Weinmannia spp.	Kamahi	
Wikstroemia spp.	Mou'a, Oahu false Ohelo	Common
Wilkesia spp.		
Wisteria spp.	Wisteria	Very Common
Zea	Corn	Occasional
Zea mays	Corn	Occasional
Zea spp.	corn, maize	Occasional
Zelkova serrata	Zelkova	
Zelkova spp.	Zelkova	
Zygocactus spp.		Occasional